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NATIONAL INDEPENDENT ASSOCIATION'S CONVENTION.

The annual convention of the National Independent Telephone Association will be held at Hotel La Salle, Chicago, January 13, 14 and 15. It is important that all independent telephone men attend.

POST OFFICE AND TELEPHONE ENGINEER.

THE United States Post Office has just made a ruling on the transmission of TELEPHONE ENGINEER through the mails which will greatly increase the usefulness and effectiveness of this publication to its readers and advertisers.

Under the administration of Postmaster General Hitchcock, a number of alleged economies were effected. Prominent among these was the distribution of monthly magazines by *freight,* instead of by fast mail trains. Some saving to the Post Office Department undoubtedly accrued from this operation, but at a cost of considerable loss to the readers of such magazines, and especially the monthly trade papers.

Obviously, the condition meant that all "news" printed in a monthly paper was no longer news when delivered to the reader by the leisurely means of a freight train. It meant, also, that issues of *weekly* papers, sent out contemporaneously, reached their destination much earlier than the monthly papers. The weekly papers thus gained a great advantage not only in reading "scoops," but in that their advertisements reached the readers first and were consequently answered first. Thus where contemporaneous issues of weekly and monthly trade papers carried the same advertising "copy," the weekly, even with a smaller actual circulation, might bring more "inquiries" to the advertiser by virtue of getting the reader's first attention.

Against this unfair and arbitrary ruling TELEPHONE ENGINEER fought persistently and continuously,

CONVENTION DATE CHANGED.

The convention of the Independent Telephone Association of America will be held at Hotel La Salle, Chicago, January 6, 7 and 8, and not on the dates announced last month.

JANUARY 6, 7 AND 8.

apparently single-handed. It takes time to move such large bodies as the United States Government, and our case had to be taken practically clear up to the President before any result was apparent.

But persistence won, as ever. We have been notified by the second assistant postmaster general that Telephone Engineer is about to be restored to fast mail delivery. The result will, we expect, be apparent with our next issue, and our readers will again receive their copies within a few hours after they are printed.

TWO CONVENTIONS.

THIS month will witness not merely an independent convention, but two such events, wholly separate and distinct, yet actuated by substantially the same motives, patronized by practically the same exhibiting manufacturers and attended, let us hope, by the same visitors. For if the visitors are not the same, each convention can have but half of them; yet if they are the same, why two conventions?

We have already expressed ourselves on the uneconomy of two associations, with ostensibly the same objects, working in one limited field. To say that a house divided against itself cannot stand is bromidic; besides, the situation is not so serious as that. But it is a fact that two independent associations represent an economic waste beside which two telephone systems in the same house spell efficiency itself.

The new association, by changing the date of its convention from the twentieth, twenty-first and twenty-second to the sixth, seventh and eighth of the month, gained whatever advantage there may be in coming first. Between its last day and the opening date of the old association's convention, the thirteenth, five whole days intervene. And exactly the same condition existed in a reverse direction before the new association's date was changed. Just why five dull, dead days should be so essential an insulation between the conventions does not appear.

But, anyway, whether the visitors to the first convention stay over for the second, or the visitors to the second convention come early enough for the first, or not, it is a long time since independent telephone men have had so many or such important things to talk about and build future plans upon. So remarkable have been the events of the last month, indeed, that every independent telephone man must feel impelled to seek out his fellows and relieve his mind of some of the newly generated ideas.

And while the operators have been busy, the manufacturers have not been idle by any means. Visitors to the exhibition floor of either convention will see some entirely new wrinkles in operating and construction.

A new page of telephone history has just been made. Now, if ever, is the time to lay plans for a bigger future than independent telephony ever before had opportunity to develop. To one or the other, if not both conventions, should come every independent operator in the United States and Canada. They are all more or less affected by the new order, and the only way they can fully understand its meaning, and take advantage of its promises, is to get together—and this month is the only opportunity for another year.

AN EPOCH IN TELEPHONE HISTORY.

ORDINARILY, when one is moved to write an editorial for the January number of a telephone paper, summarizing the striking events of the year past, it is difficult to recall at once any occurrence sufficiently epochal for a first example. The year 1913, however, was kinder in its history-making. Just before it passed out it wrote into its records an entry so startling and important that many will call it the event, not of the year, but of a decade—nay, of the whole history of the industry. We refer, of course, to the American Telephone and Telegraph Company's agreement with the United States Government.

At the risk of duplicating our own efforts, we will print here the letter signed by N. C. Kingsbury, vice-president of the American Telephone and Telegraph Company, and addressed to the attorney-general of the United States, under date of December 19, 1913:

Wishing to put their affairs beyond fair criticism, and in compliance with your suggestions, formulated as a result of a number of interviews between us during the last 60 days, the American Telephone & Telegraph Company, and the other companies in what is known as the Bell system, have determined upon the following course of action:

First: The American Telephone & Telegraph Co. will dispose promptly of its entire holdings of stock of the Western Union Telegraph Co. in such way that the control and management of the latter will be entirely independent of the former, and of any other company in the Bell system.

Second: Neither the American Telephone & Telegraph Co. nor any other company in the Bell system will hereafter acquire, directly or indirectly, through purchase of its physical property or of its securities, or otherwise, dominion or control over any other telephone company owning, controlling, or operating any exchange or line which is or may be operated in competition with any exchange or line included in the Bell system, or which constitutes or may constitute a link or portion of any system so operated, or which may be so operated in competition with any exchange or line included in the Bell system.

Provided, however, that where control of the properties or securities of any other telephone company heretofore has been acquired and is now held by or in the interest of any company in the Bell system and no physical union or consolidation has been effected, or where binding obligations for the acquisition of the properties or securities of any other telephone company heretofore have been entered into by or in the interest of any company in the Bell system and no physical union or consolidation has been effected, the question as to the course to be pursued in such cases will be submitted to your department and to the Interstate Commerce Commission for such advice and directions, if any, as either may think proper to give, due regard being had to public convenience and to the rulings of the local tribunals.

Third: Arrangements will be made promptly under which all other telephone companies may secure for their subscribers, toll service over the lines of the companies in the Bell system in the ways and under the conditions following:

(1) Where an Independent company desires connection with the toll lines of the Bell system, it may secure such connection by supplying standard trunk lines between its exchanges and the toll board of the nearest exchange of the Bell operating company.

(2) When the physical connection has been made by means of standard trunk lines, the employes of the Bell system will make the toll line connections desired; but in order to render efficient service, it will be necessary that the entire toll circuit involved in establishing the connection shall be operated by, and under the control of, the employes of the Bell system.

(3) Under the conditions outlined above, any subscriber of any Independent company will be given connection with any subscriber of any company in the Bell system, or with any subscriber of any Independent company with which the Bell system is connected, who is served by an exchange which is more than 50 miles distant from the exchange in which the call originates.

(4) The subscribers of the Independent company having toll connections described above, shall pay for such connections the regular toll charge of the Bell company, and in addition thereto, except as hereinafter provided, a connection charge of

ten cents for each message which originates on its lines and is carried, in whole or in part, over the lines of the Bell system.

The charges incident to such service shall be made by the Bell company against the Independent company whose subscriber makes the call, and such charges shall be accepted by the Independent company as legal and just claims.

(5) Under this arrangement, the lines of the Bell system shall be used for the entire distance between the two exchanges thus connected, provided the Bell system has lines connecting the two exchanges. Where the Bell system has no such lines, arrangements can be made for connecting the lines of the Bell system with the lines of some Independent company in order to make up the circuit, but such connections will not be made where the Bell system has a through circuit between the two exchanges.

(6) Any business of the kind commonly known and described as "long lines" business, offered for transmission over the lines of the American Telephone & Telegraph Co. shall be accepted for any distance; that is, on such "long lines" business calls shall be accepted where the point of destination is less than 50 miles from the exchange where the call originates as well as where the point of destination is greater than 50 miles therefrom.

(7) Any business of the kind commonly known and described as "long lines" business offered for transmission over the lines of the American Telephone & Telegraph Co. shall be accepted at the regular toll rate and no connecting charge shall be required. But such calls shall be handled under the same operating rules and conditions as apply to calls over the local toll lines.

It may be that lawyers and shrewd business men, reading this offer, will observe in it what they characterize as "jokers." We hasten to say that if such there be, we cannot believe them intentional. Mr. Kingsbury's letter must be sincere in what it promises. A resort to technical legal tricks is hardly in harmony with the solemnity of the occasion. But it may be interesting to read more slowly a second time.

First: The A. T. & T. Co. will break all connections with the Western Union Telegraph Company. Let us, to simplify matters, quote an editorial in the Chicago *Examiner:*

President Wilson congratulates his attorney general upon the successful dissolution of a combination which was not in restraint of trade, but *for the benefit of trade!*

The telephone trust has been ordered to separate itself utterly from the Western Union Telegraph Company. The telephone company has agreed to obey the order. An arrangement by which millions of citizens got better and cheaper telephone and telegraph service has thus been sternly terminated by a firm executive hand.

The American Telephone & Telegraph Company has been informed that it must relinquish its less than 30 per cent interest in the telegraph company, and forthwith cease a co-operation that has put thousands of dollars into the pockets of the public, added immeasurably to public convenience, invented the "day letter" and the "night letter," and reduced rates both by cable and land lines.

No wonder an approving President pats a complacent attorney general on the back! A blow has been struck that will teach corporations that no such combination or co-operation can be tolerated by the government, whether it is beneficial to the public or not.

Apparently because this particular combination happened to prove beneficient it has been sundered. The extraordinary ability of the telephone company's officials galvanized a decadent telegraph service into life and energy. The stock did not go up. It went down. Six million dollars was added to the expenses, and profits actually declined more than $200,000. Forty thousand miles of new wires were strung in one year. The number of offices was increased by 1,000. And by the day and night letters, and deferred rates on cables, the cost of telegraphing was vastly decreased. Incidentally it was made possible for the sender to use his telephone as a local telegraph station and dispatch messages direct from his fireside.

That must have constituted the crime.

Quick of decision, the watchful and waiting attorney general determined that the telephone and telegraph companies should be separated. What mattered it that but twenty-four hours before the postmaster general had earnestly recommended that they be actually consolidated for the public good and put under government control as a natural monopoly?

What has Attorney General McReynolds to do with Postmaster General Burleson? Nothing!

Let the companies dissolve, he decreed, and the companies, nothing loath, agreed to dissolve.

A decree has been prepared for presentation to the court. Thus a combination, *not in restraint of trade,* but made to give cheaper and better service in order to extend trade, will be destroyed. The price of stock will rise. The price of service will rise. The people, already smarting under a tariff without reciprocity, will pay the price.

But the administration rests supremely happy. It has achieved a triumph. And the superlative genius of an attorney general who could at one stroke please big business and make little business pay the piper is smugly receiving congratulations from a delighted President!

The greater part of that effusion we are forced to approve. Let us add that the telephone and telegraph are *not* competitors—any more than the telegraph and the mails are competitors. And the greatest efficiency of both telephone and telegraph comes when they are combined on the same wires. Can that be accomplished satisfactorily when they are operated by separate corporations? We cannot see how. The divorce of telephone and telegraph is a retrograde step, not progress in any sense.

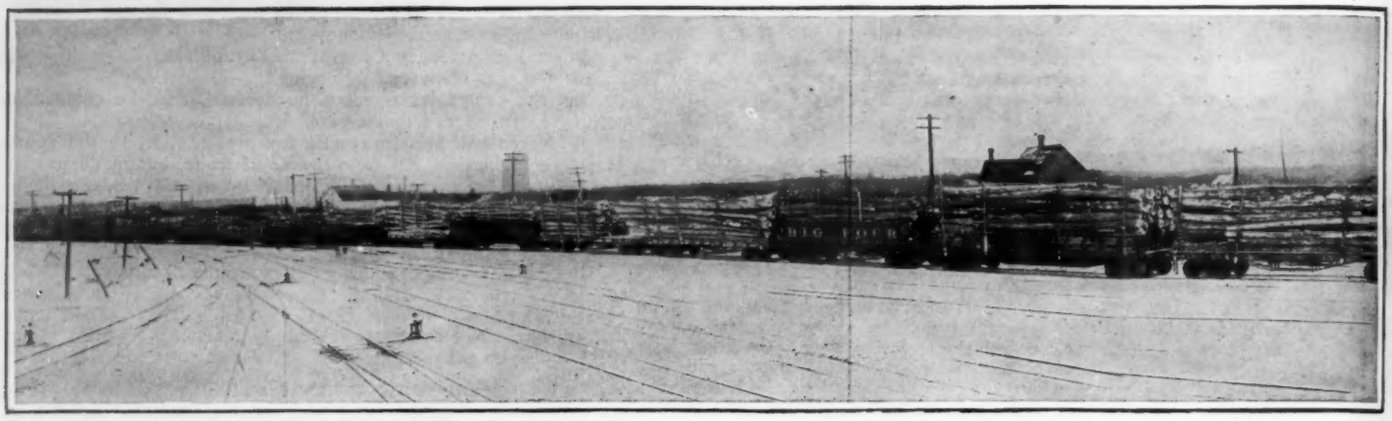
Second: No Bell company will hereafter acquire any other company operating any exchange or line which is, or may be, or might be, in competition, or which might become a part of another exchange or line which might be in competition. Unless we are misled, that covers all the independent systems there are. A skilful analyst of phrases might evade the declaration or find a loop-hole through which to slip a small independent company operating alone in exclusive territory—but we doubt it. Apparently, the A. T. & T. stands committed never to absorb another independent.

Third: Independent companies arranging connections with Bell toll lines must supply *standard* trunk lines to the nearest Bell exchange. Standard, in this case, presumably means Bell equipped.

Fourth (which is our own—there is no such division in the letter): No mention whatever is made of the Western Electric Company and its connection or disconnection with the American Telephone and Telegraph Company. So we will probably have no official ruling on the point of ethics presented by a public utility owning a manufactory which sells to competing utilities.

The immediate effect of this rather extraordinary agreement is that two independent associations and the government's department of justice get all they have been working for with astonishing suddenness. Some pessimist here suggests that a few independents may be actually disappointed in the arrangement, since it kills all hope of a profitable sale. Avaunt, evil thought! We refuse to believe it.

Thanks, then, to the Bell Telephone Company, or to the causes behind its action, the year 1914 opens with the greatest inspiration to independent telephony that it has had since competition began in 1894, just twenty years ago. It comes, too, at a time when that inspiration is most sorely needed. The restoration of confidence in the future of independent operating and manufacturing is worth more to that faction of the industry than an offer of a million dollars for investment in independent securities.



An Emergency Trainload of Telephone Poles, Rushed Out Immediately Upon Re

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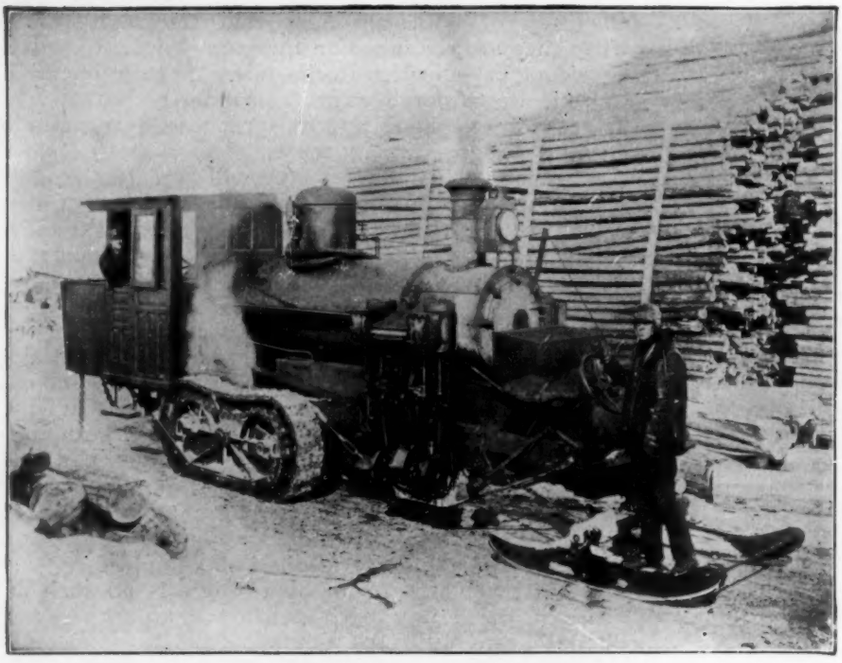


A Steam Hauling Engine for Use on Ice Roads in a Pole Country.

A Zulu Chieftain in the Johannesburg, South Africa, Headquarters of the Western Electric Company.

A Gang of Sawyers in the Cedar Pole Country.

All Ready for Dinner in a Pole-Cutting Camp.

Views of Pole Cutting Operations and Studies of the Personalities of the Timber Country. From the "Western Electric News."

STORIES IN PICTURES OF TELEPHONE PRACTICE AND PROGRESS IN ALL PARTS OF THE WORLD.

ceipt of News of Disaster. A Provision of the Various Yards of the Western Electric Company.

An Old Maori Chief of New Zealand, with a Western Electric Telephone in One Hand and the "Talking Stick" in the Other. The Latter Is Always Held when the Chief Addresses an Audience. The Photo, of Course, Does Not Show the Blue, Red, Green, White and Indigo of His Garb.

Punching "Noon Out" at the Tokyo Branch of the Western Electric Company. It Might be Dallas, Texas, or Cincinnati, Ohio, but for the Obvious Nationality of the Dramatis Personae.

A Typical Cedar Pole Maker in His Native Haunts.

A Pole Gang Ready for Work in the Big North Woods.

Views of Pole Cutting Operations and Studies of the Personalities of the Timber Country. From the "Western Electric News."

STORIES IN PICTURES OF TELEPHONE PRACTICE AND PROGRESS IN ALL PARTS OF THE WORLD.

Independent Merger Projected

The amalgamation of the independent telephone companies throughout the United States, with a view of eventually merging them with the Postal Telegraph Company, in opposition to the American Telegraph and Telephone Company, is being sought by Samuel Hill, son-in-law of James J. Hill, president of the Great Northern Railway, and himself director in railways, banks and telephone companies. This announcement was made at the conclusion of the hearing in Philadelphia, Pa., of the suit brought in the Federal District Court of Oregon to dissolve the alleged telephone trust, by C. J. Smyth, special assistant to Attorney General McReynolds.

Mr. Smyth said not only would the Federal Government sanction such merger, but would welcome it, as a step in the direction of healthy competition. He said furthermore that the Sherman act permitted this, as it forbade only the stifling of competition, not its creation.

"Samuel Hill has been fighting the Bell Telephone Company in the West for many years. He was president of the Home Telephone and Telegraph Company of Portland, and heavily interested in the various gas and electric lighting companies of the West. He has made a special propaganda of the "back-to-the-farm" movement, and through this became involved in the battle for telephone competition.

He held that in order to lure the city man back to the farm and keep the farmer there, three things were essential—free rural delivery, good roads and cheap telephones. To prove himself practical he expended much of his own money in the construction of fine roads in Washington and Oregon. Just how far his effort to amalgamate the independent telephone companies has progressed was not known to Mr. Smyth, who was of the opinion that ultimately the project might be brought to fruition.

Seeks Measured Rates for Indianapolis

The expected petition for an adjustment of telephone rates in Indianapolis, Ind., on a measured service basis has been filed by the Central Union Telephone Company with the Public Service Commission.

Accompanying the petition is a statement of the physical valuation of property, made by the company, which it is declared shows that an adjustment of the Indianapolis rates is obviously proper and necessary for a reasonable conduct of the company's business in Indianapolis, and the payment of the proper wages to its employes.

At present the principal annual rates for telephone service in Indianapolis are as follows:

Business houses—Independent line, $54; two-party, $42; extension, $10.

Residences—Individual, $24; two-party, $18; extension, $6.

The company asks for permission to put in effect the following principal rates:

Business houses—Individual, $54 per annum for 1,350 messages; 600 additional messages, 3 cents each; all additional messages above the 600 at 2 cents each; two-party, nickel machine, guaranty of 10 cents a day, and extra messages, 4 cents each.

Residences—Individual, flat rate, $33; individual, measured service, 750 messages, $30, and extra messages at 3 cents each; two-party, flat rate, $24; two-party nickel machine, guaranty 5 cents a day, and extra messages, 4 cents each.

Approximately $4,000,000 is given by the company as the physical valuation of its Indianapolis plant. This appraisal, which was made by the company's engineers, it is declared, represents as complete and careful an appraisal as was ever made of a public service property.

H. F. Hill, Jr., Indianapolis manager of the company, made a statement pointing out the advantages claimed for the measured rate method and showing why the company desires to place it in effect.

"The merit in the measured rate method is that it distributes the cost of service to the public so that each subscriber pays for what he gets and for only what he gets," he said. "Subscribers that necessarily require an extensive use of the service pay a share of the expense which is proportionate to the amount of their use.

"The expenses of a telephone company are affected much more than is generally realized by the large amount of frivolous calling. Every call costs money, and some lines are so busy that the exclusive services of an operator often are required. This needless and frivolous calling is largely prevented by the measured-rate method, and the company's expenses are reduced accordingly. If, however, some subscribers require an extensive use of the service such subscribers should certainly pay for the service they receive.

"It is generally conceded that telephone service is of value to the user in proportion to the number of persons available through its use. It is essential to the proper success of the business that the greatest possible number of subscribers be secured, and in order to induce the patronage of all whose use of the service is naturally limited, but necessary for the good of all, a low rate must be offered.

"This rate should not ordinarily be fixed at a point so low as to cause a loss to the company, although, on account of the value of such subscribers to the service as a whole, it may have to be so low as to produce little profit to the company.

"With these facts in mind the gross revenue required has been carefully distributed among the subscribers so that all present subscribers may continue the service without increased cost, provided only that they will assist in reducing the company's expenses by eliminating needless and frivolous calls."

One Commissioner's Views on Mergers

"What did the people of Detroit do to keep the Home Telephone Company from being bought up by the Bell system?" asks Lawton T. Hemans, chairman of the Michigan Railway Commission, in discussing the much-criticised report of the commission on the complaints of Detroiters about telephone service.

"The Home Company sold out at a loss of $1,000,000. When it came into the field the Michigan State Company had 12,000 subscribers. After seven years of competition the Bell Company had 70,000 subscribers and the Home Company 12,000, of which 5,000 were duplications. The people did not support the Home Company. The company invested $3,000,000 and stood to lose all. Why should it remain?

"The same condition came up in other parts of the state, the Bell buying up at greatly reduced prices independent lines which had not been supported. And yet the commission is arraigned because it permitted the merger of the companies."

First Convention of New Association

BY W. S. VIVIAN

JUDGING from the manner in which the manufacturers and supply dealers are reserving exhibit space at the convention of the Independent Telephone Association of America, at the La Salle Hotel, Chicago, January 6, 7 and 8, and the way the Association is receiving inquiries from companies all over the United States, it will be one of the best attended independent telephone conventions ever held. A partial list of the exhibitors already booked is as follows:

Automatic Electric Company; American Telephone Fire Alarm Company; Frank B. Cook; Stromberg-Carlson Telephone Manufacturing Company; Kellog Switchboard & Supply Company; Reliable Electric Company; Swedish-American Telephone Manufacturing Company; Naugle Pole & Tie Company; Julius Andrae & Sons Company; National Carbon Company; Illinois Independent Telephone Association; Walker Brothers and Haverland; Nungesser Carbon & Battery Company; Leeds & Northrup Company; Cracraft-Leich Company; American Electric Company; Telephone Improvement Company; Standard Underground Cable Company; Roebling & Sons Company; Northum Toll Register Company; Dean Electric Company; Monarch Telephone Manufacturing Company; Manhattan Electric Company; Matthews & Brother; L. S. Brach Supply Company; Electrical Contract Company; Ericsson Telephone Manufacturing Company; Coffey Audit & System Company; Specialty Device Company; Delta Electric Company; American Steel & Wire Company.

Every effort is being made to make the convention, both as to program and exhibits, one that will be of great profit to all who attend. The program committee which has been appointed is hard at work and consists of John H. Wright, Jamestown, N. Y.; Richard Valentine, Janesville, Wis.; W. S. Vivian, Chicago.

The program will include addresses and discussions on a number of subjects which are of great importance to all companies, large or small, at this particular time, such as liability insurance and the workmen's compensation act. Almost every company is directly interested in these subjects.

Accounting—With the advent of national and state commissions which stipulate methods of accounting, the average telephone company which cannot afford to hire an expert bookkeeper is somewhat confused as to how it will proceed. This subject will be treated by one who is authority and who will show that this new system is simple after all and anyone can do the work without great expense in time or money.

How to Create a Market for Home Securities—While this is a subject that has often been discussed, still it is ever an important one, as there are a number of companies that could be mentioned which have good, strong organizations and the backing of their local community, and the problem is how to get fifty or one hundred thousand dollars more capital to make the necessary extensions. The subject will be treated by one who knows.

Independent Telephony: What Shall It Be?—In these days the papers are full of articles descriptive of litigation, government hearings, investigations and reports that (as a matter of fact) the Bell Company has promised the government that it will stop its practice of buying competing telephone properties, and when it has promised that it will furnish long distance lines to all independent telephone companies with discrimination. Permit me right here to suggest that the Independent Telephone Association of America must be given full credit for causing the attorney general to institute his proceedings. Now, when some are advocating government ownership, etc., many are wondering what the end will be and what they as the representatives of their stockholders should do in order that their investments may be fully protected; hence the importance of this subject, which will be treated by one who has been close to and took a part in the developments leading up to the present situation.

The Service Department Committee consists of W. S. Vivian, Chicago, Ill., chairman; F. L. Eldridge, Chicago, Ill., secretary and manager; E. D. Glandon, Pittsfield, Ill.; R. L. Barry, St. Paul, Minn.; C. Ewing, Buffalo, N. Y.; E. L. Staderman, Terre Haute, Ind.; H. L. Beyer, Grinnell, Iowa; Hugh T. Wreaks, New York City; John W. Coffey, Indianapolis, Ind.; W. R. Goodrich, LaCrosse, Wis.; W. C. Dillon, Corsicana, Texas; W. N. McAnge, Corinth, Miss.; Walter J. Uhl, Logansport, Ind.; H. E. Bradley, Philadelphia, Pa.; Wm. A. Wynne, Raleigh, N. C.; J. B. Middleton, Portland, Ore.; F. V. Newman, Grand Rapids, Mich.

It is expected that this committee at the convention will arrange for a program of activity for the ensuing year and that it will systematically issue bulletins which will impart information that is needed by every operating company, and especially the small companies. This committee will also have direct charge of the stereopticon work throughout the convention and is arranging for a number of slides and films illustrative of the telephone industry. In fact, the lantern will be used wherever possible throughout the convention program.

Wednesday night will be the occasion of the banquet. The committee having this in charge guarantees an evening of nonsense, using music and song of such high grade that no one can afford to be absent. This committee is also arranging for one or two national characters to be present and appear on the program.

At the last board meeting, which was held on Wednesday, December 17, there were present: E. B. Fisher, Grand Rapids, Mich.; G. W. Robinson, St. Paul, Minn.; E. D. Schade, Johnstown, Pa.; Richard Valentine, Janesville, Wis.; Walter J. Uhl, Logansport, Ind.; Samuel Hill, Portland, Ore.; John H. Wright, Jamestown, N. Y.; H. L. Beyer, Grinnell, Ia.; W. S. Vivian, secretary.

A new member of the board was elected in the person of H. Linton Reber of the Kinloch Long Distance Telephone Company, St. Louis, Mo. It is expected that Mr. Reber will be of a great deal of help to the committee.

The Association, by resolution adopted by its board of directors, pledged itself that no solution of the existing telephone situation can be permanent or satisfactory that does not provide in substance:

First—That Bell monopoly and all allied interests be permanently enjoined and restrained from monopo-

lizing or attempting to monopolize the interstate telephone business by directly or indirectly acquiring competitive telephone companies engaged to any extent whatever in interstate business.

Second—That the A. T. & T. lines be declared common carriers, and, as such, open to connection with all independent companies and their patrons to points beyond the toll territory of the company seeking connection upon reasonable terms and conditions and without discrimination in favor of Bell subsidiaries and their patrons.

Third—That wherever competing telephone companies have been directly or indirectly acquired by Bell monopoly or allied interests, and the physical properties remain separate and intact, the acquisition be declared invalid and such properties restored to a true competitive field.

The board of directors has also recommended certain amendments to the by-laws, which will provide in addition to the active members originally provided for, an associate membership, a press membership and an honorary membership, which will read, if adopted, as follows:

Associate Membership—Corporations, firms and individuals engaged in the manufacture of telephone apparatus, material and supplies, or engaged in the sale of telephone supplies may, *upon application,* be elected to associate membership and shall be entitled to all the privileges of this Association, except the right to vote or hold office. All applications for such membership shall be subject to the approval of the board of directors.

Press Membership—Corporations, firms and individuals publishing trade journals relating to telephony and allied subjects may, *upon application,* be elected to press membership and shall be entitled to all the privileges of this Association except the right to vote or hold office. All applications for such memberships shall be subject to the approval of the board of directors.

Honorary Membership—Honorary members, may, upon recommendation of the board of directors, be elected by vote of a majority of the members represented at any annual meeting and shall be entitled to all the privileges of this Association except the right to vote or hold office.

Membership of any company in this Association may be discontinued upon the affirmative vote of three-fourths of the board of directors.

On Tuesday, December 23, there were 218 companies enrolled, operating more than a half million telephones in 29 states and Canada.

A "Kick"

Here is a letter written by one "G. F. S." to the Mountain States Telephone and Telegraph Company at Denver:

Here's a kick to go on file with the scores of others which, I doubt not, you're constantly receiving.

There's a difference in this kick, however. It's against the subscribers instead of the operators. I've had to use phones ever since they were invented, but until I turned farmer, four years ago, my calls and recalls were always among business men. Now it's different. Hence this kick, modestly and moderately aimed at the dear little suburbanites—of both sexes—whom a party-line brings together.

One of the commonest occurrences among us is to answer a call and be met by the greeting—sometimes pretty harsh—"Who is this?" If the call is wrong, which in three cases out of four is undoubtedly due to indistinct enunciation of the number called, your name is probably strange to the caller, and he wastes his own time and yours by howling again: "Who is this; what is your name?" finishing with an explosion: "Aw, git off the line. I don't want you!"

Such a man—or woman—may not mean to be discourteous; they are simply ignorant. If it was put up to them that they are acting just as rudely and foolishly as if they walked up to a stranger's door, rang the bell and greeted the person who opened that door with: "Who are you? What's your name?"—if they were once impressed with such wasteful and discourteous folly, they'd abandon the practice.

A few moments after I commenced this letter a call, distinct and unmistakable, came on my phone. I took down the receiver and found two voices abusing each other for being on the line, and one—a woman—instantly transferred her attentions to me.

"Here's another butter-in! Get off the line, can't you?"

I hung up, and within two minutes the call was repeated. The woman had subsided or disappeared, and the man who wanted me got me.

Unusual? Not much! On these country party lines I can assert positively that 50 per cent of the times when a man answers a call or makes one, he is met with such treatment. The operator is, of course, powerless in such cases, and yet the fiercest and most frequent growls at operators come, I know, from subscribers who—I also know—are the most ignorant of the first simple principles of using a phone.

The installation of the instruments could be greatly improved in very many private houses. I'll illustrate by two cases, close by. At a neighbor's the phone is installed in the parlor—the company room—always strictly closed. There's a Utah best crop there, all right—eleven children—and the phone needs a lighthouse fog-bell to get above the jubilation of those kids. Consequently the heads of the family denounce the service as atrocious, asserting that the operator is always too busy chewing gum to connect up when a call is made. I have had occasion, on irrigation matters, to sometimes call up this man, but I've sworn off now. I don't enjoy posing with a receiver at my ear for several intervals of four or five minutes each to get an answer. My wife says my pose is not picturesque, so I throw a saddle onto a horse and ride over.

But the poor man "doesn't know, you know." He can get other men when he wants them, but they can't get him; and his denunciations would frequently be highly enlightening, even to a progressive in a stand-pat county.

Another neighbor, close by, has the instrument in the front hallway, for ornament, probably. Here there are seven children, and the workshop of the good wife is all day in the kitchen, with two doors—usually closed—between her and the phone. Her husband, engaged in town, phones—or tries to—each afternoon for his team to meet him at the county road, and when you get him started he asserts in phrases that Jack London would give dollars to hear, that he has to walk home two or three times a week because your operators can't take the trouble to connect him with his home phone.

Occasionally, in your subscribers' lists, you have, at some part of the book, where anyone can find it who cares to search, some directions as to proper conduct on phone work.

Although of fairly extensive manufacturing and distributing experience, I have no knowledge of the undoubted intricacy of telephone service; but I'm going to venture a suggestion, purely as a consumer and a—well, call it sufferer. Suppose, for instance, you should deliver to all party line subscribers a bold card which could and perhaps would be hung by the phone—an educational card, state explicitly, and in clear, concise phrasing, the troubles and delays subscribers make for themselves and their friends by such ill use of the service as I have related.

You'll remember the old spiel: "The looker-on sees most of the game." As a looker-on I feel convinced that education of subscribers is as much—much more—needed now than education of operators.

The Diamond Expansion Bolt Company sends out a folder featuring "Seven things—you will need one or more of them." The seven are the Diamond "Rapid Fire" drill, Diamond expansion bolts, Diamond reversible toggle, "Long-Saut" combination cable clamps and bridle rings, Empire conduit rods, Ajax insulator brackets and "Trident" guy clamps.

National Association's Program

A solution of some of the problems of the telephone situation will be presented by prominent men in the industry at the convention of the National Independent Telephone Association, to be held at Hotel La Salle, Chicago, January 13, 14 and 15. Though there will be differences of opinion as to the methods to be employed, there will be but one opinion as to the desired result—stability in the telephone business in every state in the Union. The valuation of properties as being arranged for by the Interstate Commerce Commission, the jurisdiction of that commission as to service and rates, the application of the Sherman Act to telephone companies—these and other questions will be discussed. There will be presented to the convention for ratification or amendment the following declaration of principles, which was adopted by the board of directors of the association December 15:

Furnishing telephone service a business proposition;

Local ownership of local telephone systems;

Compulsory physical connection of long distance lines or government operation of interstate long distance lines;

Complete federal or state regulation of all long distance service;

Separation of manufacturing and supply business from operating companies;

Amendment of existing laws so that every one may know what may and may not lawfully be done.

Resolved, That the furnishing of telephone service is a business proposition in which the interests of the user and the company furnishing the service are interdependent. Telephone service is furnished under different conditions in different parts of the country, and to meet these ever-varying conditions, we favor locally owned Independent telephone systems, reserving to the people in any locality, with the consent of the regulatory body having control, the right to determine for themselves what kind of telephone service they shall have and by whom it shall be given.

We favor the enactment of such laws as will secure to every local telephone system adequate long distance service, without discrimination and upon equal terms with every other such system, from all companies furnishing long distance service, and, in the event that this is not accomplished, then we favor government operation of interstate long distance lines.

Believing that there is at this time an overlapping of jurisdiction and a duplication of control by state commissions and the Interstate Commerce Commission which produces unnecessary expense and uncertainty that should be eliminated, we favor an Act by Congress providing that the control and regulation of exchange business and purely local or intrastate toll business should be left entirely to the states.

We favor the enactment of such laws as may be necessary to prohibit any corporation, partnership or individual furnishing telephone service, from engaging in the manufacture or sale of apparatus, material or supplies.

To restore confidence, protect property and security of investment and to avoid the uncertainty and doubt heretofore and now existing and which are at present retarding development and business progress, we favor the amendment of existing laws or the enactment of new laws which shall so clearly define what is lawful business and what is unlawful business that no confusion can possibly arise. We believe such laws should provide penalties sufficiently severe to prevent violation in the first instance.

Every man interested in the telephone industry in the United States is being invited by the association to attend its convention. Arrangements have been made for an interesting program covering the subjects in which the telephone manager is interested. The entire seventeenth floor of Hotel La Salle has been reserved by the manufacturers and supply houses. Telephone history is in the making. Every man who has money invested in the industry is vitally interested in the final solution of the question now being considered. This convention is for him especially.

Telephone Curfew in Atlanta

Mrs. W. B. Price-Smith of Atlanta, Ga., is author of the latest sensation in woman's club circles—a curfew on Atlanta women's telephone conversations.

The custom abolishes the use of the telephone by women after 6 p. m. unless it is imperative. It decrees that women shall carry on their telephone conversations during the day only, that they may devote their uninterrupted time to their husbands and families during the evenings.

"Of course," said Mrs. Price-Smith, "if a woman is talking over the telephone when the clock strikes 6, she could finish her conversation. However, even then, it should be cut as short as possible.

"Then, too, if occasion arises when a telephone call is imperative, the custom would not hold. My motion aims only at the abolition of social conversations during the evening hours."

That the proposition will be hotly contested by some Atlanta women however, was presaged by interviews obtained.

"Women are seldom home during the day," declared Mrs. James L. Dickey, a member of the executive board of the Home for Incurables. "Therefore they virtually would be isolated from each other if telephone conversation were barred during the evening when they generally are at home."

In line with this same objection was that offered by Mrs. William Clare Spiker, president of the Atlanta Center of the Drama League.

"There are 500 members of the Drama League," she said. "A great majority of these seldom can be reached at their homes during the day. Therefore, the evening virtually is the only time during which we can make plans over the telephone. I do not believe the project could be accomplished."

However, many prominent women declared themselves as highly in favor of the curfew custom.

Mrs. Charles J. Haden, president of the City Federation of Women's Clubs, said:

"The idea is a splendid one. I believe, however, that it is as important for women to make their conversations over the telephone more businesslike. Of course there are many things in a club woman's life that has to be discussed over the telephone and in the evenings, but the point is, such things could be discussed in a more businesslike way.

"If all club women would agree not to use the telephone after 6 o'clock it would be a good thing. I am in favor of the movement, and also in favor of women learning to make brief their telephone conversations."

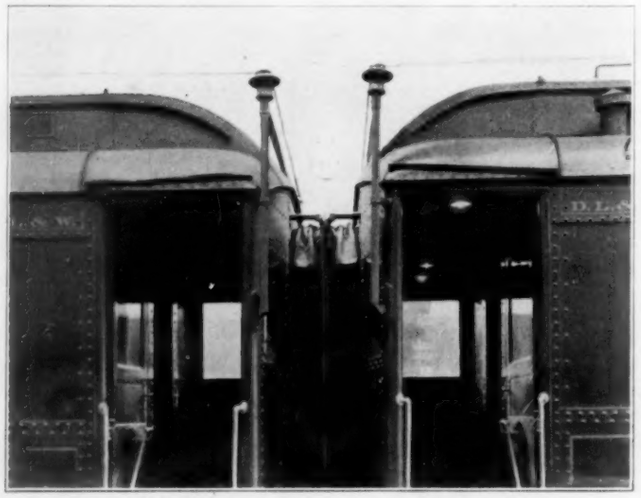
Mrs. Jay Kling, for many years president of the Woman's Relief Corps of the Grand Army of the Republic, is of the opinion that the plan would be a fine one.

Convicts to Have Telephone

A new telephone system is being installed in the Western Penitentiary by Warden John Francies. Scattered all through the prison yard, in the shops and on the front lawn, weatherproof telephone boxes have been placed. Instead of the men at work going for tools, they call from one of these boxes and the articles are sent to them. Three boxes have been placed on the outside for the men who take care of the lawn and grounds. In case a call is sent from the office, a light shows on the boxes.

Binghamton Passenger Station of the Lackawanna Railroad, Showing Wireless Antennae on the Roof. Working Radius, About 300 Miles.

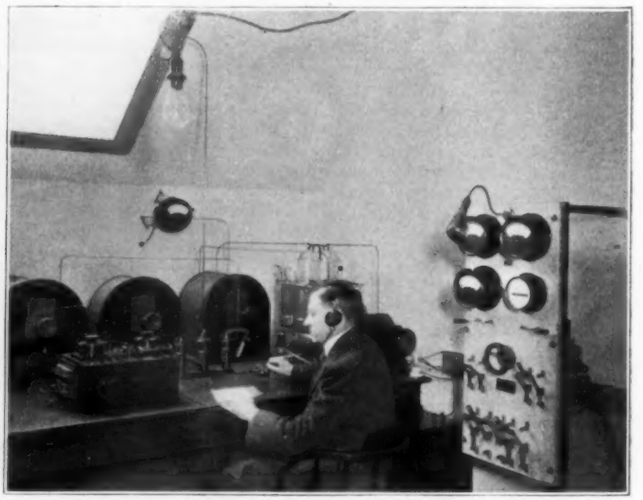
Lackawanna Railroad's Passenger Station at Scranton, also Equipped with Wireless Antennae. The Working Radius Here Is also About 300 Miles.



Wireless Aerials or Antennae on Passenger Coaches of the Lackawanna Railroad.

The Wireless Operator in His Office on a Lackawanna Train.

The Wireless Office at the Scranton Station.



The Wireless Office at the Binghamton Station.

VIEWS SHOWING THE USE OF WIRELESS TELEGRAPHY ON THE DELAWARE, LACKAWANNA & WESTERN RAILROAD.

Wireless for Railroad Trains

Uninterrupted Communication at All Times by New System

RECENT experiments in the utility of wireless telegraphy in directing the movements of trains have demonstrated the immense possibilities of safety and time saving by insuring immediate and constant communication at any speed and at any distance from stations, regardless of line breaks from weather conditions, fogs, washouts and such other factors which railroads have accepted as existing yet heretofore unconquerable. A test just made successfully on the Lackawanna Railroad on an express train running between New York City and Buffalo has furnished sufficient evidence of the success which ultimately will factor prominently in emergency cases where communication by present methods is practically impossible.

Lackawanna Limited No. 3, Carrying Wireless Equipment.

In the ordinary wireless telegraph system messages are sent and received between stations equipped with antennæ or "aerials" supported on high towers. The Lackawanna Railroad has stations of this kind at Scranton, Pa., and Binghamton, N. Y., with a working radius of about 300 miles. As it is impossible to use an ordinary aerial on account of the tunnels and bridges, a prominent feature of these tests is the use of a highly special aerial for the train installation. Some very recent experiments, notably those conducted on November 21 and 23, have demonstrated that wireless communication can be maintained to and from a train equipped with a very low aerial, viz., a quadrangle of wire supported at a height of only eighteen inches above the roof of the car. The distance between Scranton and Binghamton is about 65 miles, and in the experiments just made it was found possible to maintain communication from a train running at 55 miles per hour, part of the time direct from the train to the fixed station away from which the train was speeding; and when the train had proceeded to a point too far away for its short aerial to force signals through to this first station direct, the signals were delivered to the station by being picked up at the second station and relayed back. At no time during the tests was the train out of communication with both stations in this way.

The arrangement used consists of four quadrangular aerials mounted on the roofs of four adjoining cars of the train, and only 18 inches above same, as stated. Each quadrangle is connected to its neighbors on the other cars by a special attaching plug. The wireless operator's station is installed in a booth in the third car of the group, so as to bring the lead from his apparatus to the fourfold aerial at a point at the middle of same. The regular Marconi system is employed, except that the power is furnished by a special motor-generator set driven from the regular train-lighting dynamo, and the ground connection is made to the rails by a wire to one of the car trucks. The aerial is of heavy copper wire, and is insulated for the high sending voltage (between 8,000 and 9,000 volts) by a large porcelain insulators mounted on iron posts at the corners of the car.

The special usefulness of the system was indicated recently when the conductor of the train was taken ill, while his train was running at high speed, westbound. The next station at which a relief conductor could be obtained was Scranton, 30 miles away. Ordinarily a delay would have been unavoidable—either a stop in order to send a telegram by wire asking for a relief conductor, or a wait at Scranton after arrival at that point. With the aid of the wireless telegraph equipment there was no need to take either of these measures. Instead, the conductor notified the wireless operator on the train and the latter sent a message direct to Scranton, with the result that a relief conductor was on hand to take charge when the train pulled in. In the same way an extra car, needed to provide accommodations for an unusual crowd of passengers, was ordered to be in readiness to be coupled on at Scranton, thus eliminating the delay that would ordinarily have been experienced in getting the car up from the yard.

Apart from this emergency value, however, a demonstration that the wireless telegraph can be depended upon for unfailing communication between running trains and fixed stations and between the trains themselves may mean a revolution in the operation of trains comparable to that which followed the introduction of the ordinary wire telegraph for this purpose. When railroads can install reliably tuned equipment whereby dispatchers and train conductors are able to keep in direct touch regardless of stops, it becomes possible to save no inconsiderable amount of time in *routine* train operation—possibly equivalent in some instances to the time saved by regradings, cut-offs, and other improvements on the right-of-way that require such large appropriation of capital in modern railroad work.

Since the first wireless telegraph message from a moving train to a fixed station was flashed, the improvement of the wireless service between trains and stations for commercial and operating purposes has been steadily going on.

The latest accomplishment is the setting of signals by wireless from a moving train or from a fixed wireless station. There is no longer any doubt that the wireless can be depended on for this signal service. If an operator at a station, he said, wants to set a signal for a moving train not in communication with him he can cause the semaphore blade of the signal post to rise or fall as he wishes by simply sounding the proper dots and dashes on his key.

By means of a selective device the operator can set a signal at any point if he has occasion to flag a train.

If any mistakes are made in the orders issued to en-

gineers and conductors at stations or in the case of any emergency in which a train must be stopped to avert an accident, the station operator can signal the train as certainly as if he had direct wire communication with some one on board.

Another valuable use to which the wireless-controlled signals can be put is the handling of freight trains on long runs. At present a through freight must make many stops between its starting point and destination, so that orders and instructions concerning right of way can be delivered to the conductors, but these frequent stops are a source of expense and delay which will be abolished by the wireless telegraph and will result in great economy of operation.

With direct communication with a train and the ability to set and release signals by wireless, dispatchers can keep in touch with conductors and make the stops needless. The wireless permits the dispatcher to board every train and deliver his instructions as surely as if he handed them to the conductor in a sealed envelope.

There are many fields in railroad operation, in routine business, and in emergencies when lives and property can be saved by the use of the wireless telegraph.

Commercial telegrams have already been sent from the trains on test trips and there is no doubt but that this will open up a new field of communication to those who find it necessary to communicate with the outside world while en route.

Burleson's Report Urges Government Ownership

A sweeping declaration in favor of the principle of government ownership of telephone and telegraph lines was made by Postmaster General Burleson in his first annual report, transmitted to Congress, December 17.

This follows recent conferences on the subject between the postmaster general and President Wilson and reports that the President was about to make federal ownership of the two utilities an administration policy.

Mr. Burleson points to the successful inauguration and extension of the parcel post system as a guarantee that the postoffice department is capable of handling further country-wide business of great magnitude and importance.

In regard to taking over the telegraph and telephone systems, Mr. Burleson says, in part:

A study of the constitutional purposes of the postal establishment leads to the conviction that the postoffice department should have control over all means of the communication of intelligence. The first telegraph line in this country was maintained and operated as part of the postal service, and it is to be regretted that congress saw fit to relinquish this facility to private enterprise. The monopolistic nature of the telegraph business makes it of vital importance to the people that it be conducted by unselfish interests, and this can be accomplished only through government ownership.

The act of July 24, 1866, providing for the government acquisition of the telegraph lines upon payment of an appraised valuation, and the act of 1902, directing the postmaster general "to report to congress the probable cost of connecting a telegraph and telephone system with the postal service by some feasible plan," are evidences of the policy of the government ultimately to acquire and operate these electrical means of communication as postal facilities, as is done by all the principal nations, the United States alone expected.

The successful operation of the parcel post has demonstrated the capacity of the government to conduct the public utilities which fall properly within the postal provision of the Constitution.

Every argument in favor of the government ownership of telegraph lines may be advanced with equal logic and force in favor of the government ownership of telephone lines. It has been competently decided that a telephone message and a telegram are the same within the meaning of the laws governing the telegraph service, and therefore it is believed that the statute enabling the government toa cquire, upon payment of an appraised valuation, the telegraph lines of the country, will enable the government to acquire the telephonic network of the country.

Burleson is supervising the draft of legislation for the taking over by the government of telephone systems throughout the country as an adjunct to the postal service.

Average Daily Calls

Interesting figures on telephone calls have just been compiled by N. S. Westlake, general commercial agent of the Cincinnati and Suburban Telephone Company. On November 10 he arranged for a "peg count" day, and it was from the tally kept at that time that the figures were obtained. In Cincinnati, for instance, Mr. Westlake finds there is an average of 241,111 excess or useless calls each day. This is due, he believes, to the fact that Cincinnati has not the measured service of the larger cities. It ranks third of all the cities of the country in the number of average daily calls. Detroit is first with 8.5 calls per telephone and Indianapolis second with 8.1. Cincinnati's average is 7.7. Mr. Westlake, in his report, calls attention to the fact that there are 70,915 separate telephone stations in Cincinnati. Of these 32,727 are business stations and 38,188 are in residences. The local switchboards are equipped for 5,028,866,310 possible connections for these phones. The average time taken by operators in answering calls is 3½ seconds.

On last "peg count" day, between 10 and 11 a. m., the busiest hour, there were 68,849 calls, or 12½ per cent of all. On this day it took 937 operators working a total of 6,593 hours to handle the service. Mr. Westlake adds a comparison of the number of telephone subscribers today, 70,915, with the number on January 1, 1900, which was 7,429, an increase almost tenfold. One of the interesting features of the report is a table showing a comparison between the large cities of the country. It is as follows:

City.	Average calls per day.	No. calls per tel. per day.
Detroit	700,500	8.9
Indianapolis	,231,000	8.1
Cincinnati	546,045	7.7
St. Louis	482,200	7.5
Cleveland	355,000	6.5
Milwaukee	230,900	5.6
Chicago	1,725,357	5.2
Pittsburgh	305,000	4.3
New York	1,650,050	4.2
Philadelphia	521,000	3.9

The low calling rate for New York, Philadelphia and Pittsburgh is due to the fact that the service is measured.

Matanzas Telephone Plant for Sale

The telephone plant of the city of Matanzas has been offered for sale by the government in a decree signed by President Gomez, says the Cuba *Review*. All rights and interests in the plant have passed to the government through expiration of the franchise under which it was operated by a local company. It will now he sold to the highest bidder, subject to right of "tanteo" enjoyed by the Cuban Telephone Company. Under this right the company has the privilege of equaling or of raising the figures of the highest bid, providing the company is not the highest bidder when bids are opened.

The Government and the A. T. & T. Company

A Record of Some Recent Events in Telephone History

ATTORNEY GENERAL M'REYNOLDS on December 19, made public details of an agreement for the reorganization of the American Telephone and Telegraph Company, which will prevent litigation to dissolve that corporation under the anti-trust act, and under which it is claimed competitive conditions will be restored in the telephone service of the entire country. The combine will dispose of its holdings in the Western Union Telegraph Company.

The reorganization plan originated with the company, although it followed many reports that a suit against it might be filed. It was regarded by department of justice officials as the most striking indication offered in a decade that big businesses has concluded that it is better to follow the Sherman law than fight it.

The plan met not only the approval of the attorney general and officials of the subsidiaries of the combine, but was also approved by President Wilson.

In a letter to Mr. McReynolds the president expressed his admiration for the attitude of the telephone company, and his conviction that such conduct on the part of business men meant a building up of business on sound and permanent lines.

Coming on the heels of the announcement that Postmaster General Burleson is seriously interested in government ownership of telephone lines, the action of the department of justice took an added significance and some officials expressed the opinion that it indicated legislation to acquire the country's telephone business would not be pressed by the administration at the present session.

In brief, the agreement provides:

The American Telephone and Telegraph Company will dispose promptly of its holdings in the Western Union Telegraph Company, so that each concern shall be under distinct managment, and be entirely independent.

The company will not hereafter acquire control of other telephone companies, and where control of telephone companies has already been acquired, but no actual physical union has been effected, the American Telephone and Telegraph Company will submit the course it is to pursue to the Interstate Commerce Commission and to the department of justice.

The company will promptly make arrangements by which all other telephone companies in the United States shall have access to its toll lines.

Department officials said the plan gave the government everything and more than it could have hoped to obtain in court. Officials were more than pleased with the last part of the agreement, by which the Bell Company gives long distance service to subscribers of other companies, and did not deny that they never had hoped to gain such a point by suit under the anti-trust act.

The agreement will not affect the suit entered several months ago to dissolve the connection of the Bell Company with the Pacific Telephone and Telegraph Company, the coast branch. This suit will be pressed by the department to determine how far the Sherman anti-trust act applies to telephone companies.

President Wilson's letter, written to the attorney general today, was one of the most interesting documents made public in connection with the settlement.

MY DEAR MR. ATTORNEY GENERAL—Thank you for letting me see the letter from the American Telephone and Telegraph Company. It is gratifying that the company should thus volunteer to adjust its business to the conditions of competition. I gain the impression more and more, from week to week, that the business men of the country are sincerely desirous of conforming with the law, and it is gratifying, indeed, to have occasion, as in this instance, to deal with them in complete frankness and to be able to show them that all that we desire is an opportunity to co-operate with them. So long as we are dealt with in this spirit, we can help to build up the business of the country upon sound and permanent lines.

Cordially and sincerely yours,

WOODROW WILSON.

Mr. McReynolds in accepting the American Telephone and Telegraph Company's offer wrote to N. C. Kingsbury, vice president of the company, as follows:

Permit me to acknowledge, with expressions of appreciation, your letter of December 19, outlining the course of action which the telephone companies composing the Bell system obligate themselves to follow in the future.

Your frank negotiations in respect of these matters compel the belief that what you propose will be carried out in good faith; and it seems to me clear that such action on your part will establish conditions under which there will be full opportunity throughout the country for competition in the transmission of intelligence by wire.

May I take this occasion to say that the administration earnestly desires to co-operate with and to promote all business conducted in harmony with law; and that, without abating the insistence that the statutes must be obeyed, it will always welcome opportunity to aid in bringing about whatever adjustments are necessary for the re-establishment of lawful conditions without litigation.

The announcement of the agreement for re-organization came at the conclusion of several months of negotiation, in which the attorney general, Mr. Todd, and Mr. Kingsbury, Theodore N. Vail, president of the American Telephone and Telegraph Company and other parties on both sides conferred. Mr. McReynolds took up the question early in his administration and officials of the telephone company showed a willingness from the first to do anything in reason to satisfy the government's demands.

As point by point in a tentative scheme was worked out, Mr. Kingsbury carried it to New York, submitted it to the directors of the American Telephone and Telegraph Company and to other companies interested, and in every instance secured the approval of the department and of officials of the companies concerned.

There never was a serious hitch in the plans and Mr. McReynolds clearly indicated to the telephone officials not only his desire to avoid litigation, but his aversion to any scheme for government ownership.

The plan finally was submitted to the attorney general with the statement that the company wished to put its affairs beyond fair criticism.

Some of the details of the reorganization are yet to be perfected. The department has such confidence in the corporation's desire to do the right thing, however, that it has left such matters to its officers, and any reasonable amount of time will be granted.

Although exact information as to the extent of Western Union stock held by the Bell Company was

not available, it was understood to be about 30 per cent.

Mr. McReynolds has no desire to force the combine to clear its treasury of this stock in a week or a month, or any set period of time.

From the point of view of an independent telephone system, one of the most interesting parts of the agreement is the use of the through lines of the Bell Company.

Under the agreement an independent company may secure connection with Bell toll lines by *supplying standard trunk lines* to connect with the Bell toll boards, the Bell Company operating the entire toll circuit when connections are made. Connections will be given with Bell subscribers or subscribers of other independent companies served by exchanges more than fifty miles distant from the place where the call originates, independent subscribers paying *in addition* to the regular Bell toll charge *a connection charge* of 10 cents for each message.

This charge will not be made on "long lines" business, and long lines business will be accepted for less than fifty miles as well as for a greater distance.

The authorized capital stock of the Bell Company December 31, 1912, was $500,000,000, its bonded indebtedness at that time about $105,000,000. From October, 1906, to April of the current year, it has paid 8 per cent annually.

The Western Union Company had an authorized capital of $100,000,000, practically all of which has been issued. Late in 1911 the American Telephone and Telegraph Company held more than $29,000,000 of this stock.

Theodore N. Vail, president of the American Telephone and Telegraph Company, gave out the following statement on the proposed reorganization of his company and its separation from the Western Union Telegraph Company:

> The agreement was the result of a protracted and exhaustive discussion between the attorney general and our company and speaks for itself. We are complying with the government because we desire that our operations shall continue to be, as we have always believed them to be, in strict conformity to law, and for that reason we are now adjusting them to the law as understood and interpreted by the attorney general.
>
> We are confident that under the proposed changes neither the Bell system nor the Western Union will suffer and that both will continue to give the same an increasing efficiency service to the public.
>
> In relinquishing the Western Union, while we do so with great regret, we have the satisfaction of knowing that it is in better physical and financial condition than it was when we took it over, and that the share holders will soon be benefited in some measure by what has been done.

Government Takes Testimony at Philadelphia

Testimony in the government's case against the American Telegraph and Telephone Company was taken in the Philadelphia Federal building at hearings in which officials of a number of independent companies testified. The evidence was taken in the form of depositions and will be offered by the government as part of its case when the trial to dissolve the company begins in the United States District Court at Portland, Ore.

The evidence considered important from the government's standpoint was offered during the afternoon by G. B. Rudy, general manager of the York Telephone and Telegraph Company of York, Pa. Under the direct examination of C. J. Smith of Omaha, special assistant to Attorney-General McReynolds, he testified that shortly after the Bell Telephone Company purchased the equipment of the Maryland Telephone Company, over which the York company carried on its long distance business into Maryland, the service became so bad that it was virtually forced to discontinue its long distance business. This was while the York company had a contract to run for two years, during which the Bell company was supposed to furnish the long distance service. He added that he was notified fifteen months before the expiration of the contract that the York company would not be furnished with long distance service after the contract had expired.

He also testified that entrance of the independent company into the telephone business in York forced the Bell company to reduce its rate for a four-party line from $72 to $48 for a single party line. The local service in York, he said, was good, but the long distance connections by the independent company, especially to Baltimore, was poor, because of the service rendered by the connecting companies, which he claimed were under the control of the Bell company.

Other testimony regarded as equally important was offered by F. C. Redfield, a former employe of the American Telephone Company at Boston, Mass. He turned over, prior to his taking the stand, copies of vouchers approved in the office of the general manager of the telephone company when he was in its employ.

The vouchers, which were entered as exhibits, were for various sums paid to different newspapers in New England. These sums ranged from $1.02 to $1200, which he said were paid for the express purpose of creating public sentiment in behalf of the American Telephone Company.

C. M. Thompson, an employe of the Kellogg company, was also one of the witnesses who testified during the afternoon. He told of the increase in number of names in the telephone directories of the Keystone and Bell Telephone companies in Philadelphia during the last three years.

Mr. Thompson also testified that prior to 1902, when the Keystone Telephone Company entered the field in this city, rates were much higher and the service was not as satisfactory as it is at present. It was only during the last ten years that Philadelphia secured better service and cheaper rates. The Keystone company, he said, was the first to introduce the five-cent rate, which was afterwards followed by the Bell company.

Charles E. Bagley testified that the service rendered to the Postal Telegraph Company was very unsatisfactory. He is in the employ of the Postal Telegraph Company and said that since the American Telegraph Company assumed control of the Western Union, messages were diverted to this company by the Bell company, although the messages might come from patrons of the Postal Telegraph Company.

Several witnesses are to be heard and further testimony will be taken in other cities throughout the country.

The telephone trunk line connecting the general post office, Dublin, with the new cable which crosses from Holyhead to Howth has now been completed. The wires are carried on high standards, which have been set at some distance from those of the tramway company. The standards, instead of being placed on the road, have been erected on concrete foundations in the sea along the edge of the harbor, and are carried thence on the western side of the railway line to the city.

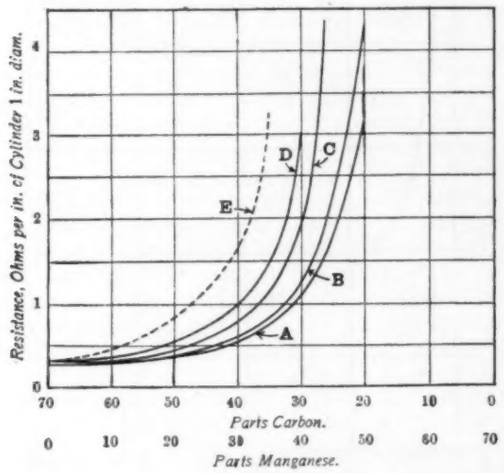
The Telephone Scrap Book

Curious and Useful Items, More or Less Telephonic, Gathered from Everywhere

Data on Dry Cells

BY C. HAMBUECHEN AND O. E. RUHOFF.*

A NEARLY standard method of dry cell construction appears to prevail in America. The anode is a cylinder of sheet zinc, which serves also as the container. The electrolyte is a solution of chloride and ammonium chloride held in a layer of absorbent material, usually paper, lying next to the zinc, and separating it completely from the cathode. The cathode consists of a carbon pencil surrounded by a granular mixture of manganese dioxide, carbon and ammonium chloride. Graphite is also a common ingredient. This granular mixture is saturated with electrolyte containing ammonium chloride and zinc chloride in solution. The chemical inspection of dry cell materials should include a determination of the purity of these materials, especially as regards the presence or absence of quantities of useless inert substances, so as to



A=Coarse manganese and fine carbon. B=Coarse manganese and coarse carbon. C=Fine mangenese and coarse carbon. D=C with 8.5 parts $ZnCl_2$ solution. E=D with 7.5 parts sal.

indicate the percentage of the materials on which depend the usefulness of the cells. In addition to this, tests should also be made for comparatively small quantities of such impurities as exert an actively injurious effect upon the cell. The physical properties of some of the materials are of quite as great importance as are the chemical ones. One of the most important of these is the conductivity of the crushed carbon and graphite, and that of the mixtures of these materials with manganese dioxide. The conductivities of crushed carbon and graphite depend upon the raw materials used in their manufacture, the conditions of heat treatment used and the size of the granules in the composition. Battery carbon may be prepared from petroleum coke, retort carbon, or coke made from soft coal. The graphite which is used may be either a natural product or that manufactured by electric furnace methods. Crushed carbon and graphite may also be prepared from used furnace electrodes, or from worn-out electrodes from electrolytic processes.

For the determination of the conductivities of crushed materials and mixtures an apparatus especially devised for the purpose was used. The material to be tested is placed in a porcelain tube 2 inches long and 1 inch inside diameter. The bottom of the tube is closed during the test by a removable graphite plug, and the tube is filled flush with the material to be tested. The tube is placed in an upright position and another graphite plug inserted at the top upon which a pressure of 15 pounds is exerted by means of a suitably arranged lever and weight. A current of 1 ampere is passed, the graphite plugs serving to make connection to the column of granular material. The circuit includes an ammeter and a variable external resistance. The drop in voltage between the graphite plugs is measured by voltmeter. This same testing apparatus is also arranged to test the conductivity and breaking strength of carbon pencils. A number of samples of crushed graphite and carbon as supplied by various manufacturers and made by various proceses have been tested for conductivity. For graphite there have been obtained readings varying between 0.071 and 0.411 ohm and for carbon between 0.188 and 0.637 ohm per linear inch of a column 1 inch in diameter, equaling resistances of 0.14 to 0.82 ohm for graphite and 0.37 to 1.27 ohm for carbon, per cubic centimetre. The minimum readings in each case represent a very high grade of material, while the maximum ones indicate materials which are practically useless for most battery purposes. Most of the samples of carbon tested have been crushed so as to pass through about a 20 mesh screen while the samples of graphite will usually pass through a 100 mesh screen. In comparison with carbon and graphite, the other insoluble ingredient of pulverized dry-battery filler —manganese dioxide—has a very low conductivity, so that as far as the final conductivity of the whole mixture is concerned, the manganese dioxide may be considered as practically a non-conductor. It follows, therefore, that the higher the proportion of MnO^2 in the depolarizing mixture, as compared with the conducting ingredients, the higher will be its resistance, presuming, of course, that the size of granules in the composition and the quality of materials remains the same. The curves plotted on the accompanying chart indicate in a general way how the conductivities change with variations in the the proportions of conductive to non-conductive materials, and with variations of the size of granules in the composition for the same proportions by weight. Variations in the conductivity of 10 to several hundred per cent can be brought about by varying the size of granules in the composition of a mixture, with no change in the proportion by weight of the several ingredients.

Four of the typical brands of cells investigated and concerning which data are given in the tables are designated by the letters *A, B, C* and *D*. It will be noted from the tables that there is comparatively little variation in the composition of these several makes of batteries. Perhaps one reason for this is the strong demand of the American market for a low-priced cell, compliance with which places narrow limits on the manufacturer in indulging any desire he may have to improve the quality of the battery by using more expensive materials, or by devising a more complicated structure.

Table I. shows the weights, dimensions and physical

*Abstract of a paper read before the American Electrochemical Society.

properties of several types of batteries. The size of granules in the composition and the percentage MnO^2 on the several sizes of the washed and dried mixtures is shown in Tables II. and III. In general, it seems that an increase of MnO^2 in the coarser sizes will reduce the internal resistance of the battery. On the other hand there are indications that an increase on the proportion of very finely divided manganese dioxide results in greater depolarizing power per unit weight of the MnO^2.

Table I.

	A.	B.	C.	D.
Voltage of cell	1.50	1.57	1.55	1.50
Amperes on short-circuit (flash test)	33	33	32	30
Weight of cell, grammes	980	932	984	942
Weight of moist depolarizing mixture, grms.	642	545	576	574
Weight of paper lining, wet, grammes	61	71	65	72
Diameter of carbon pencil, inches	1	1	1	0.75
Weight of zinc, grammes	117	110	132	151
Resistance, in ohms, of depolarizing mixture per linear inch of a 1-in. column	0.94	1.69	1.90	0.86
Resistance, in ohms, of depolarizing mixture per cubic centimetre (resistivity)	1.84	3.31	3.72	1.69
Relative coherence of depolarizing mixture.	1.9	1.7	1.5	1.6

Table II.

Screen Analysis of Washed and Dried Depolarizing Mixtures.

	A.	B.	C.	D.
On 20 mesh (8 openings per cm.), per cent	4.8	0.2	1.3	0.5
On 40 mesh (16 openings per cm.), per cent	25.5	12.8	20.0	29.0
On 60 mesh (24 openings per cm.), per cent	11.8	14.3	10.5	12.0
On 80 mesh (32 openings per cm.), per cent	4.3	5.3	7.0	3.3
On 100 mesh (40 openings per cm.), per cent	9.8	22.5	28.8	12.0
On 150 mesh (60 openings per cm.), per cent	2.3	7.3	8.5	4.5
Through 150 mesh (60 openings per cm.), per cent	41.5	37.6	24.2	38.7

Table III.

Percentage of MnO_2 in Various Sizes.

	A.	B.	C.	D.
On 20 and 40 mesh	74.9	71.5	82.5	60.3
On 60 and 80 mesh	53.8	61.6	46.3	45.9
On 100 mesh	45.2	38.3	27.1	41.8
On 150 mesh	44.4	37.0	30.8	38.1
Through 150 mesh	31.3	38.3	50.2	31.7

Table IV.

NH_4Cl and $ZnCl_2$ in Papers and Mixture.

	A.	B.	C.	D.
Grammes NH_4Cl in papers, per cell	10.1	13.4	12.3	12.3
Grammes NH_4Cl in mixture, per cell	36.2	42.6	25.1	30.5
Grammes NH_4Cl, total, per cell	46.3	56.0	37.4	42.8
Grammes $ZnCl_2$ in papers, per cell	7.0	6.8	9.7	8.9
Grammes $ZnCl_2$ in mixture, per cell	13.8	10.3	15.8	15.5
Grammes $ZnCl_2$, total, per cell	20.8	17.1	25.5	24.4

Table IV. shows the quantities of zinc chloride and ammonium chloride present in the solution held in the paper and in the solution with which the depolarizing mixture is moistened. The quantity of water present in a No. 6 dry cell varies somewhat for different makes. The lower and upper limits are about 60 and 90 grammes. Other things being equal, a better cell probably results from approaching the latter figure rather than from too close an approach of the former. Measurements of the conductivity of the mixtures were made directly upon the depolarizing material as removed from the batteries, but previous to making the test all of the mixtures were passed through a 10 mesh screen. The internal resistance of the battery depends, naturally, not only on the conductivity of the mixture, but also the tightness with which it has been compressed in filling the cell. Additional factors influencing the internal resistance that will result from any given mixture are the weight per unit volume of battery space and also the manner in which the packing is performed.

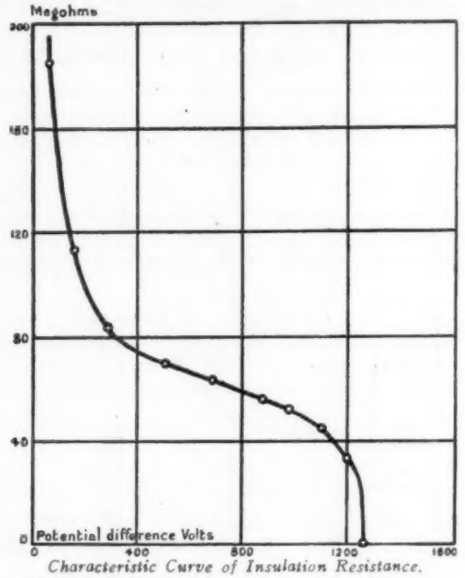
The remaining common ingredient of dry cells is the least costly of all, but it is nevertheless of considerable importance. This is the air occupying the "void" spaces in the depolarizing mixture—that is, space not occupied by water, salts, carbon, graphite or manganese dioxide. The volume of voids varies from about 3 cubic cm. to 15 cubic cm. All the data given have reference to a standard "No. 6" cell, the dimensions of which are 2½ by 6 inches.

Insulation Resistance

IT is high time the electrical worker knew more about breakdowns of insulation. At present he tests "blindly"; that is to say, he applies either graduated or "flashing" tests until the sample gives way, and he forms his opinions accordingly. But he does not see what is happening; the black puncture hole is there, and may be examined with a glass even; but there is no record, no guidance as to what led up to the collapse.

If we knew exactly what took place, if we had portrayed for us the chain of events, testing, might be put upon a proper scientific basis. For one thing, it should be possible to foretell the breakdown point of a dielectric without breaking it down at all, without even straining it. Now, what is the behavior of insulation under pressure?

The characteristic curve appears to be governed only by moisture. The solid portions of the dielectric itself, apart from the interstices holding moisture, seem to play no part in the record. Their insulation resistance is gen-



Characteristic Curve of Insulation Resistance.

erally infinitely high, and not worth taking into account. In most cases insulation resistance decreases, in a perfectly definite way and almost instantaneously, as the electric pressure upon it is increased, and it slowly recovers if the pressure is restored to the initial value or cut off altogether. The connection between these two facts is by no means obvious, yet Sydney Evershed, who read a paper on the subject before the British Institute of Electrical Engineers, finds them so closely related that by dint of explaining one of them he hopes to understand the other.

Therefore the author has tried, by investigating the nature of leakage conductors, to establish some definite relation between applied potential difference and insulation resistance. If the curve expressing this relation be traced from a few volts up to the breakdown point, it will be found to consist in general of two parts of opposite curvature more or less like the voltage-resistance curve shown in the diagram. It is on the earlier portion of this curve, which Mr. Evershed finds to be due to moisture, that his experiments have been carried out. Later on he will investigate the middle and the right hand portions of the curve.

There are strong reasons for believing that the con-

ducivity of a semi-insulator, or so-called insulator, is due to the maze of capillary channels inside the porous material. Fortunately, the total water absorbed by any cubic block of material is wonderfully inefficient in providing conductive channels. Thus, a cubic centimetre of water has a resistance of only 2,500 ohms. But if this be absorbed by a slab of paper insulation, only a very small proportion conducts current, the rest becomes scattered, separated, and "dormant." The conducting portion is roughly about one part in one hundred thousand parts of the total water.

A close consideration of all the symptoms led the author to believe that the porous delectric might be imagined as a maze of apillary channels and isolated cells, in which a certain fraction of the total moisture disposed itself along these channels in such a manner that normally only a small portion of it conducted. Reserve water is also available along these channels, however, and this is forced into service by a rising difference in potential.

Imagine a glass tube containing a series of plugs of water separated by air bubbles. The exceedingly thin film of water along the glass surface of each air bubble is all that conducts at first. But electric endosmose may alter all this; water from the plugs may go to reinforce the films outside the air bubbles.

We cannot suppose the drops to coalesce in order to form a continuous leakage path, because in that case conduction would be simply that of an electrolyte and would follow Ohm's law, leaving the moisture curve unexplained. We must therefore look for connecting links between the drops to establish a complete conducting chain. It would be natural to suppose the links to be films of some kind condensed on the surface of the capillary passages in the insulator, and to account for the characteristic curve the films would have to be endowed with a property analogous to that of the electric arc; with increasing electric pressure they must increase their sectional area either by means of the leakage current they carry, or in consequence of some effect which, like endosmose, depends on the potential gradient.

Endosmose may be made visible in a short glass tube connecting two water vessels. By contact with the glass the water in the tube acquires a positive charge which occupies a cylindrical layer of water next the wall of the tube, being held there by the corresponding negative charge in the glass surface. When a potential difference of several hundred volts is maintained between the water vessels, the charged water in the tube is strongly attracted towards the negative vessel, and moves in that direction down the potential gradient.

To return to the experimental tube with its chain of drops and films. On applying an electromotive force to the electrodes in the two breakers the effect of electric propulsion or endosmose was at once apparent. On closing the circuit the surfaces of the two drops visible in the field of the microscope instantly changed their curvature, the positive surface pushing its edge out towards the negative side of the field of view, and the negative surface decreasing its curvature by withdrawing its edge inwards. If the film connecting the two drops happens to be visible every part of it is seen to experience a sudden force pushing it towards the negative side. The effect of the hydraulic pressure produced in the drops by the electric propulsion is seen at the same time; a stream of water is forced out from the edge of the positive drop and flows rapidly towards the negative drop, increasing the thickness of the film as it goes along. The advancing wave front of the traveling water is clearly visible, and if the potential difference is gradually increased, the growing thickness of the now moving film is made apparent by its assuming, one after another, the colors characteristic of thin films.

The sectional area of the films is of course exceedingly small compared with that of the drops and hence the resistance of a complete tube of given diameter is determined almost entirely by the aggregate length and mean thickness of the films, the resistance of the drops being negligible by comparison. The visible increase in the thickness of the film will therefore be made evident also by a concurrent fall in the resistance of the tube, and if a series of tests be made at gradually increasing potential differences the characteristic curve of the tube as an absorbent insulator may be drawn.

When the electromotive force is cut off, the surfaces of the drops are instantaneously restored to their normal shape. The surplus water in the films when withdrawn very slowly into the adjacent drops, until, after a period which may be hours rather than minutes, the films are reduced to their initial thickness and the resistance of the tube recovers its initial value.

Thus, Mr. Evershed concludes that the characteristic moisture curve is the direct result of electric endosmose. It is nearly always moisture that we have to deal with—this curve always betraying itself—and the true dielectric resistance of insulation is too enormous to be considered. We may saturate a sample in varnish under pressure, we may bake it, enamel it, do what we like with it. But, in course of time, moisture will have its way. There is no available means of excluding it.

Selling Switchboards in Norway

SELLING a switchboard in Europe is as complicated a process as elsewhere, the complications often taking an unusual complexion. There are the language difficulties, the well-directed talking points of our competitors, and the usual human unwillingness to part with the money. In this, we have passed over such minor

Messrs. Reinke, McBerty and Brofos Wearing Skis. "Snowed Under" on the Way.

difficulties as trying to make a magneto telephone engineer understand the marvels and ingenuity of an automatic telephone system, says *Western Electric News*.

But to all these obstacles, there was recently added one new in the European experience, showing how even

the elements often attempt to assist one's competitors in their efforts to keep one from the order.

In Bergen, Norway, there is a private and progressmatic on the map of Scandinavia.

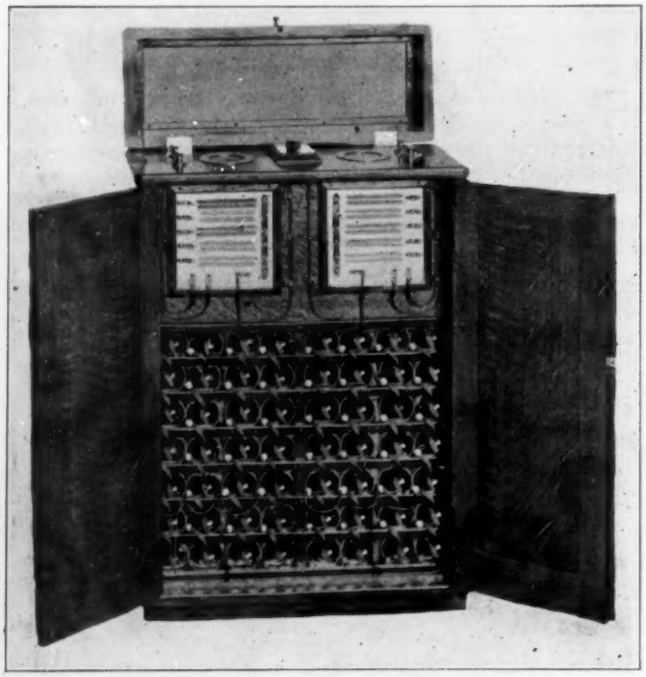
In the summer of 1912 there was only one system that merited consideration in the eyes of this company, and that system was not the Western Electric system. The situation looked far from rosy when Einar Brofos, himself a wily native, appeared on the scene, with a group switch and a group of arguments ready to turn the situation through 180 degrees.

When he had them at the 175 degree point or thereabouts, a few days before the final directors' meeting, he called for assistance, which arrived in the shape of Messrs. McBerty and Reinke of the European general engineering department. What happened to the party in their attempt to reach Bergen and how they were tied up five days by a blizzard in Norway's mountains is shown graphically in the picture. They finally were forced to return to Christiania and to circle the coast in a small, playful steamer, reaching Bergen in time to help turn the remaining five degrees and to land an order for a 5000-line semi-automatic job.

Amplifier for Telephone Currents

By C. D. Lindridge.

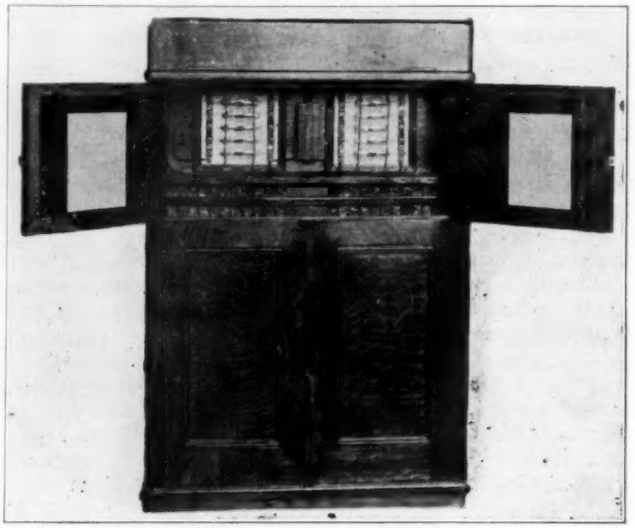
A RECENT form of amplifier for amplifying weak currents using ionized gas valves is shown in the accompanying photographs. The valves used in this



Amplifiers Mounted in Cabinet.

amplifier contain one hot electrode and one cold electrode, and are of essentially the same construction as the Fleming oscillation valves used as receivers for radio telegraphy. Dry cells are used as the source of current, although storage cells connected across a 110 volt lighting circuit may be used in a permanent installation.

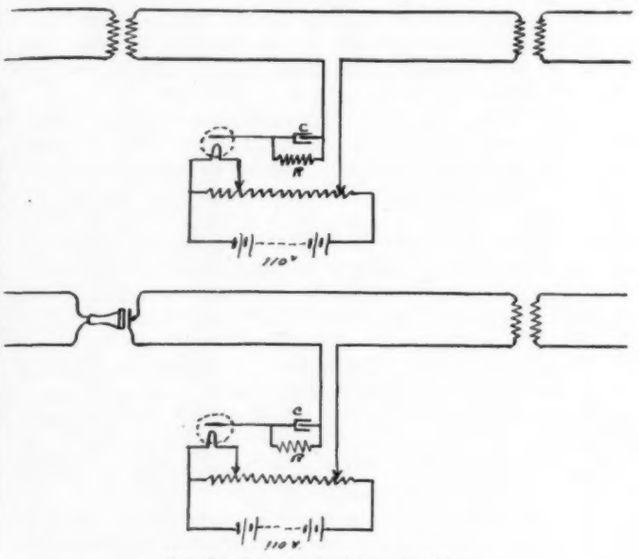
The high resistance, *R*, shunted by the condenser, *C*, shown in the circuit drawings is included in order to cause the potential across the valves to fall when their resistances decrease and to thus admit of the filaments being brought to a higher temperature without producing saturation of the ionized gas space. This necessitates the use of a high voltage battery, but it was found some



Rear of the Amplifier Cabinet.

months ago that the amplification can be appreciably increased by this means.

Where it is desired to electrically separate the main line sections a mechanically associated transmitter and receiver relay may be used. As the amplification is obtained from the valves and not from the relay, the relay may be of a type that is permanent in adjustment, as it is



Circuits of the Ionized Gas Amplifiers.

not required to be very sensitive. The relay effectively prevents the amplified currents from entering or affecting the main section of the line in the direction toward the transmitting station.

Salesmen and travelers should be interested in the John Willy Hotel Directory, published by the *Hotel Monthly*, Chicago, and sold for one dollar. It lists 15,000 leading hotels of the United States and Canada.

A New Basis for Rate Making

Address Before the National Convention of Railway Commissioners at Washington

BY MAX THELEN*

THE fundamental relationship between the public and its utilities is that of principal and agent. Out of this relationship should grow the proper basis for determining the rates which a public utility is entitled to charge. The state has the right to do for the public whatever is demanded for the public welfare, including the establishment and operation of enterprises of a public utility character. What the state can do itself it has the right to delegate to private corporations and persons to do for it.

In carrying out the agency the public has given to the public utilities the right to use the streets and highways and to take the property of private persons in the exercise of the power of eminent domain. These are tremendous powers which are conferred by the state only upon its agents in the prosecution of enterprises of a public or quasi-public character. In eminent domain proceedings the plaintiff must allege and prove that the use is a public use and that the plaintiff is in charge thereof. He can be in charge thereof only as the agent of the public to carry out powers exercised in behalf of the public as principal.

Now with regard to the bearing of this relationship on the problem of the proper basis for rate fixing. It is a well established principle in agency that an agent acting within the scope of his authority is entitled to be reimbursed for the money which he honestly and judiciously expends for the benefit and account of the principal, together with a proper compensation for his services.

As a general rule, it is a breach of good faith and of loyalty to the principal for an agent to deal with the subject matter of the agency so as to make a profit out of it for himself in excess of his lawful compensation.

If such profit is made, the agent may be held as a trustee and may be compelled to account to his principal for all profits and advantages acquired by him out of the relationship. If the agent acquires title to property in his own name as part of the agency, he will be deemed to hold this title for his principal. If A is the principal and B the agent, and A, for the purpose of enabling B to carry out the agency, deeds property to B, B cannot later contend that he can hold the property for himself. He holds it for his principal. Likewise, if B, in the course of his agency, acquires title to property from any source, and that property thereafter increases in value, he cannot lay claim to keep the increase for himself. In each of the above cases the agent holds the property for the principal and the agent, of course, must account to the principal for it.

Applying these principles to the relationship between the public and the public utilities, it seems clear that the public utilities are entitled to a reasonable return upon such money as they honestly and wisely expend for the public, but they should not be allowed a return on the increased value of the property used in the agency. If the agent has expended money dishonestly or has expended it injudiciously, he is not entitled to a return thereon. On the other hand, if he has acted honestly and wisely, and it thereafter becomes possible to acquire more cheaply property which he has purchased in the agency or to secure at a lesser expense labor or material used therein, the agent should not be compelled to suffer the loss, but should be entitled to a return on the money honestly and wisely spent by him in pursuance of the agency.

This conclusion has been worked out by Justice Van Fleet in the water rate case of the San Diego Land & Town Company vs. National City (174 *U. S.* 739), logically and on principle from the fundamental relationship existing between the public and its public utilities. The use of the present value or the reproduction value theories does not spring in any way out of that relationship and has no necessary connection with it. As Justice Van Fleet clearly points out, the use of either the present value or the reproduction value theories may be as clearly unjust to the public utilities on the one hand, in case prices have gone down, as it is to the public on the other hand, in case values have gone up. In logic and justice, the public utility should receive a return on the money reasonably and properly expended in the acquisition and construction of its works actually and properly in use to carry out its agency—and it should receive no more and no less.

A study of the decisions and of the trend of events shows clearly the cause of the adoption of the present value or the reproduction value theories. In the first cases which came before the courts, the utilities claimed a return on the amount of stocks and bonds outstanding or on the original cost, including large expenditures either dishonestly or unwisely incurred. The courts say clearly that it would be unfair to allow a return on such basis, and in looking for a way to avoid the unjust results which would follow therefrom, hit upon the present value and the reproduction value theories. But in doing so, the courts did not see that the application of these theories might with increasing values, particularly of land, result in an injustice to the public just as great as the injustice which would ensue in many cases if the amount of outstanding securities were used as the basis or if the original costs, swollen by dishonest or injudicious expenditures, were used. In seeking to avoid Scylla many of our courts have rushed into Charybdis. The time has unquestionably come for a return to first principles.

Franklin K. Lane, whose ability on the Interstate Commerce Commission marks him as one of the great constructive statesmen of the age, clearly saw the danger which now confronts us.

In the Western Advance Rate Case (20 *Interstate Commerce Commission Reports,* 307), Mr. Commissioner Lane reaches the following conclusion as to the proper basis of fixing rates, with which conclusion I am heartily in accord:

> The trend of the highest judicial opinion would indicate that we should accept neither the cost of reproduction, upon which the Burlington's estimate of value is made, nor the capitalization which the Santa Fe accepts an approximate value, nor the prices of stocks and bonds in the market, nor yet the original investment alone, as the test of present value for purposes of rate regulation. Perhaps the nearest approximation to the fair standard is that of bona fide investment—the sacrifice made by the owners of the property—considering as part

*The author is commissioner and attorney for the California Railroad Commission.

of the investment any shortage of return that there may be in the early years of the enterprise. Upon this, taking the life history of the road through a number of years, its promoters are entitled to a reasonable return. This, however, manifestly is limited; for a return should not be given upon wastefulness, mismanagement or poor judgment, and always there is present the restriction that no more than a reasonable rate shall be charged.

Mr. Lane's conclusion is based upon the fundamental relationship between the public and the utilities, it is accurate in theory; and it is just both to the utilities and to the public. In my opinion, it furnishes the best single basis for fixing rates and the basis to which attention should primarily be directed whenever the facts can be ascertained. Of course there will be cases in which modifications of this basis will have to be made. I am only seeking to ascertain the proper basis to use as a starting point in rate fixing inquiries.

It has been said that original cost, including betterments and additions, should not be used as a basis for utility rates, for the reason that it is often difficult to ascertain original cost. This objection goes not to the correctness of the principle but to the difficulty of applying it in a given case. It is true that in the eastern, and to some extent the middle western sections of this country, it is often impossible to ascertain the original cost of public utilities. In such case the courts and commissions should strive to ascertain as nearly as they can what the original cost reasonably should have been. A number of commissions in applying the reproduction test ascertain as nearly as possible what the work reasonably should have cost under the conditions under which it was actually performed. This test is practically the same as the test herein advocated. If it is impossible to ascertain the unit price and the conditions under which the work was originally performed, it may become necessary to ascertain reproduction value less depreciation as of the time when the rate inquiry is held. In doing so, it should be clearly borne in mind that this is being done not because reproduction less depreciation is the proper ultimate basis, but because it furnishes in the particular case the best available evidence of what the original cost reasonably should have been. If we bear this fact clearly in mind, we shall not rush into the dangers which ensue from the use of the present value or reproduction value test, without clearly understanding its significance. In California, the railroad commission has ascertained the original cost of right-of-way and terminal grounds of a considerable number of railroads, including all the land of the Western Pacific Railway. In other western and middle western states it will be possible to a considerable extent to ascertain the original cost, particularly of land.

It has frequently been urged that a public utility is entitled to a return upon the present value of its property or upon the reproduction value thereof, for the reason that it has title to the property, and it has been argued that a failure to give to a public utility a reasonable return upon the property to which it has title would be to confiscate its property in violation of the 14th Amendment to the Federal Constitution. This conclusion overlooks the relationship between the public and the utility and is based on the erroneous assumption that title is the basis of a fair return in public utility cases.

Referring to the first point, the Supreme Court, beginning with Mr. Justice Harlan, in the case of Smyth vs. Ames, has held that a utility is entitled to a return upon the fair value of the property, considering, however, all the circumstances. The most fundamental of these circumstances is the agency relation existing between the public and the utility. The utility takes its property subject to that relationship and can no more urge the plea of confiscation than can any other agent who acquires his property in the course of the agency and who is accountable to his principal for it. It would be just as logical for an agent who has acquired title to a piece of land in the course of his agency to claim confiscation if he is not allowed to keep the unearned increment for himself as it is for a public utility to make the same plea with reference to the property which it holds in its capacity as agent.

Referring now to the argument that title is the determining factor in ascertaining the proper basis for rates, it is evident that this view is erroneous. A public utility may, in the pursuit of its agency, spend large sums of money properly chargeable to capital account and entitled to be considered in rate fixing inquiries, and yet the utility may not secure title to the property represented by that money. For instance, a railway company may be put to considerable expense in paving streets, the title to which is in the public. Again, the company may build expensive structures in the public streets and may incur large expenditures for grade separations in the public streets. That the company is entitled to a return on the money so expended, even though it does not have title to the property acquired thereby, must be admitted by every fair-minded person. If it is just that the utility should be allowed a return in certain cases on money expended on property to which the utility does not secure title, it seems equally just that it should not be allowed a return on property to which it does have title, in excess of the amount to which, under its agency relation, it is fairly entitled. This thought is expressed by Whitton in Section 192 of his valuable work on "Valuation of Public Service Corporations," as follows:

> Similarly if the government has given this same company the land for its right-of-way, the actual property in which the company has invested its capital and not that part to which it has title but which has been donated by the government should be considered in determining reasonable rates. Actual title and possession are not always conclusive. The determination of a reasonable rate is an equitable process and equity will demand that certain property to which the public has title should be included and certain other property to which the company has title should be excluded. It is the actual investment or sacrifice on the part of the company that is entitled to consideration regardless of mere title or possession.

The reason why a private citizen buying land is entitled to the unearned increment while a public utility acquiring land is not so entitled is that the citizen is performing no function of government and is not acting as an agent of the government, while the utility owes its entire existence and right to operate to the action of the state in conferring upon it certain of the powers of government, such as the right to use the streets and to take private property, to be used in the pursuance of its agency. The two cases are entirely different. To reach a conclusion in the one by an analogy to the other is extremely dangerous.

Commissioner Maltbie of the New York Public Service Commission of the First District, has clearly seen the difficulties arising out of appreciation of values and has tried to avert the danger by considering appreciation in value as income and balancing it against depreciation in other kinds of property. However meritorious this theory may be, the Appellate Division of the Supreme Court of New York, in the case of People ex rel. Kings County Lighting Company vs. Willcox, decided on May 9, 1913, refuses to adopt this view. While it seems clear that the result which Commissioner Maltbie desires to ascertain is correct, and that his theory, if adopted, would reach that result, I am of the opinion that the same result

would be obtained more logically by starting with the basis herein explained than by starting with the cost of reproduction less depreciation basis. It seems to me wiser to return to first principles and to adopt a basis which springs logically and justly out of the fundamental relationship between the public and public utilities. If the courts fail to adopt this view, Commissioner Maltbie's theory appears to offer the only remaining hope.

In view of the tremendous importance of the problem and the uncertainty as to its ultimate solution, the policy to be pursued in the meantime by the various state railroad and public service commissions becomes a matter of serious consideration. I would suggest that in making physical valuations of utility properties and making their findings thereon, the commission confine themselves to findings on questions of fact, and refrain whereever possible from finding as to the ultimate question of value. This is the policy pursued by the California Commission. The commission makes its findings on certain questions of fact, including the facts with reference to the organizations and operation of the railroad, its stocks and bonds, its revenues and expenses, its original book cost, its reproduction value and its present value, by which latter term is not meant the ultimate fact of present value, but what may be termed the reproduction value less depreciation. The commission accummulates all these facts and makes its findings on them, but refuses to make a finding on the ultimate question of the value of the property. The value may be one sum for one purpose and another sum for another purpose. The correct value depends, fundamentally both on the purpose for which it is to be ascertained and on the correct principle to be adopted in ascertaining it. Until the Supreme Court of the United States has clearly and unequivocally established the principle which it considers correct after its attention has been squarely drawn to the tremendous importance of the question of appreciation in value, I believe it would be far wiser for the commissions to adopt the policy which the California commission is at the present time pursuing. Whenever the correct principle is definitely established, it will be possible to refer to the findings of the commissions on the various branches of the question and from these findings to determine the ultimate fact of the value which is to be assigned to the property for rate making purposes. By exercising care with reference to these facts, and distinguishing clearly between a fact and a conclusion therefrom, the commissions will avoid the danger of putting themselves in a position from which they cannot withdraw and of adopting theories and making findings which will later come back to plague them.

I accordingly suggest that the various state commissions do all in their power to draw the attention of the courts to the dangers which confront them and to secure, if possible, the establishment of the principle herein contended for, which principle I believe to be correct in logic and in justice, and that in the meantime the commissions so do their work that they do not commit themselves in a way which will work increasing injustice to the public throughout the generations which are to come.

A Bochum engineer, named Joseph Reineke, has devised a wireless telephone system for use in mines, on original lines. The system has been at work for the past four months with success in the "Carolinenglück" colliery at Bochum-Hamm, and the "Minster-Stein" mine is now being fitted with a similar equipment.

Connection Rulings In Montana

A complaint filed with the Montana Public Service Commission by the East Side Telephone Company of Creston and having to do with exchange service charged by the Northern Idaho & Montana Power Company, was settled by the commission December 5.

The order was as follows:

"It is ordered that on and after the 15th day of December, 1913, the Northern Idaho & Montana Power company of Kalispell and the East Side Telephone company of Creston shall receive, each from the other, calls originating on their respective lines and destined to the line of the other, and shall charge therefor a rate of five cents (5c) per call of not more than three minutes' duration, and five cents (5c) additional for each additional three minutes or fraction thereof; and this rate of exchange shall continue in full force and effect until the further order or approval of this commission."

The complaint was filed with the commission last August, and states that when the line of the East Side Telephone Company was first built into Kalispell connection was made with the central office of the Northern Idaho & Montana Power Company, and the complainant was obliged to pay a flat rate of $20 per month for exchange service.

As the membership increased and the lines were extended, the defendant company demanded a toll rate, and a rate of 15 cents was agreed upon, applicable to all calls originating on either line. This arrangement was all right, states the defendant, as long as its calls exceeded those originating on the defendant's line, but when the excess was in favor of the complainant, defendant gave notice to terminate the agreement.

The two companies failing to agree, the defendant arbitrarily, it is alleged, refused to give exchange, thereby causing great inconvenience to subscribers of both companies for many weeks.

In May, 1912, an agreement was entered into whereby complainant was to pay ten cents for each call of three minutes' duration and five cents for each additional minute, while the patrons of the defendant's lines could call up and use complainant's lines free of charge.

This agreement, the complainant considered unjust, but was forced to accept in order to have communication with the city of Kalispell. The agreement further provided that complainant must pay to the defendant a minimum of $20 per month.

The defendant company declares that the complainant repeatedly violated its agreement, which is the reason given for terminating the contract. The defendant also claims that there should be a minimum charge of $20 per month on a readiness to serve charge.

In its finding the commission says there can be no question as to the justness of requiring either line to pay a rate of exchange, and whatever that rate may be it should apply alike in either direction.

Fined Under Nine-Hour Law

Claude Currie, manager of the Broken Bow (Neb.) Telephone Company at the time complaint was made by State Labor Commissioner Pool for working his female operators overtime in violation of the labor law, was fined $20 and costs in the court of County Judge Charles Holcomb. The complaint was filed because girls who slept in the office nights and occasionally answered night calls were considered to be on the job and therefore came under the provisions of the nine-hour-a-day female employe law.

Developments of Early Telephone Apparatus

An Address Delivered Before the Convention of Telephone Pioneers of America

BY THOMAS B. DOOLITTLE

IF a Pioneer were to write his experience he must have started with his telephone career and written continuously up to the present time. As the circumstances that determine the course of an individual life are oftentimes interesting, I will relate those that opened to me the telephone field.

During the late 60's and up to 1876, I was engaged in manufacturing at Bridgeport, Conn. Certain of our goods (barbed wire) was in great demand, and rush orders by telegraph were received from points in the west and south. Our patronage of the telegraph attracted the attention of Mr. O. E. Cole, manager of the Atlantic and Pacific Telegraph Company. He called upon me to solicit business for his company and suggested that a line be run from his office to mine. "But I am not an operator." "You can learn," said he.

Our works were running double turn—twenty-four hours 'round—and I was rather busy, but you know a busy man can always take on more. I called up my old friend, D. W. Kissam, of the Bridgeport Brass Company, and suggested that we take up telegraphy as a sort of fad or pastime. Mr. Kissam entered into the scheme with enthusiasm; lines were run from our respective places of business to the Atlantic and Pacific office and to our residences. Others entered the fun, and upward of twenty stations were added. A home-made Western Union pattern switchboard was placed upon the wall over the operator's table. We then organized "The Bridgeport Social Telegraph Association." When one member wished to call another, he would sound that member's call and sign his own. The operator, hearing this, would so adjust the plugs in the switchboard that a connecting line was established between the calling and the called station.

The system was exactly comparable to a telephone exchange, in connecting business houses, factories, banks, residences, etc., except that it was operated by telegraph instead of telephone. The members of families, business men and clerks were pounding away to learn Morse. It was taking on quite a business like air when the telephone appeared upon the scene.

I took great interest in the affair, with Mr. Cole, and spent many evenings at his office discussing telegraph matters. One evening the subject of Professor Gray's experiments came up. I remarked, as I was leaving the office, "If they can make it sing, they will make it talk, and some day there will be a little device about as big as my watch that we will attach to our wires and talk to each other instead of telegraphing." A few years later Mr. Cole wrote me a letter in which he recalled this remark.

Two or three years prior to the time of the events related above, I was in a Philadelphia street car and observed for the first time the Bell punch for recording fares.

The "pink trip slip for a three-cent fare," etc. appeared to me rather complicated, so, upon my return home, I made a sketch of a fare register and handed it to my superintendent with instructions to have one made when one of the skilled workmen was at liberty. The register was finally completed.

Soon after this, Mr. W. H. Hayward called at my office. I called his attention to the fare register. He took the device to New York and interviewed some of the street railway people. He came back very much discouraged and said the jig was up.

I asked him what they said. He replied that Mr. Schribner, of the Belt Line, remarked that it would not do, as it made no provision for half fares. I said, "You go back to Mr. Schribner and tell him to do away with half fares—charge full fare or nothing." This he did, and Mr. Schribner exclaimed, "Why not!" A contract was entered into and the "Hartford Alarm Register Company" was organized. Fare registers were gradually adopted on all street railways, and half fares were abandoned. The Hartford Alarm Register Company was established in New York, under the management of Charles A. Cheever.

During the latter part of June, 1877, I was present at a directors' meeting of the Register Company when four telephones were brought in. This was on Saturday. I borrowed some of the telephones, took them to Bridgeport, and, on Sunday afternoon, members of the Telegraph Association were called together in the Office of the Atlantic and Pacific Telegraph Company, where experiments were carried on, illustrating the use of the telephone on our system. With the telephone attached, the system became a telephone exchange then and there. Tests were made from various stations, and as far out as Black Rock, some four miles distant. All interest in the telegraph system was lost, and I immediately began soliciting subscribers for the telephone system. P. T. Barnum was my first subscriber.

Willard L. Candee, of the Okonite Company, New York, was then connected with the Register Company, and many others will remember the above facts.

Mr. W. H. Hayward, secretary of the Register Company, had immediately applied for and secured the agency for the telephone in Fairfield and New Haven counties and, later, Hartford and Litchfield counties, Connecticut and Hampden and Hampshire counties, Mass. It therefore became necessary for me to work with Mr. Hayward. All telephones were sent to me in Bridgeport for distribution throughout the above mentioned territory.

During the summer and fall of 1877, telephones were placed upon the Association's wires and I had them in stock or to spare, until the Atlantic and Pacific Telegraph Company's office was closed and taken over by the Western Union.

A representative of the Western Union asked me to allow him to connect the Association wires into the Western Union office. I declined, and he said, "What are you going to do with them?" "I may rent them for clothes lines; just cut them off at the roof fixtures." Three of these wires were taken over to my new office on Fairfield avenue, and continued in service. They were also used for the purpose of illustrating the exchange to prospective subscribers.

In the meantime, I was working on the subject of central office apparatus. Having Bridgeport secured with a franchise, I visited New Haven, with the object of interesting capital in the project. I called upon Mr. John E. Earle and asked him to get his friends together and or-

ganize a company. After discussing the matter with his friends for some time, he decided not to do so.

Later on a letter from Mr. George W. Coy, manager of the Atlantic and Pacific office in New Haven, was forwarded to me. This letter was addressed to the Bell interests in Boston, asking for an agency, as, he wrote, some parties in New Haven wanted a private line. As acting agent for New Haven, I called upon Mr. Coy with the letter, and suggested that he join me in starting what we then called a district system. Mr. Coy promptly took the matter up with Mr. Hayward and me, associated others with himself and pushed the work with great enterprise. But I was left out.

My observations led me to agree with Robert Burns that there is a period in every man's life when things go awry. I have no disposition to hold Dr. Bell responsible for my misfortunes but they were coincident with his wonderful achievement. Up to 1876 I had attained more than the average success in business when suddenly and without warning it was closed out by the sheriff by reason of signed blank forms that I had left in other hands for convenience during my absence from town. This proved too great a convenience and temptation to the other man and was absolute ruin to both him and me. Friends came forward and offered me partnerships, others offered money and credit to re-establish me in business, but, curiously enough, no one would join me in the telephone proposition, and I was called all kinds of a fool for taking it up. The money to develop my exchange was secured by building private lines and from the sale to Eugene F. Phillips, of Providence, of my switch cord tip, for $2,500, and money borrowed from relatives.

A few years later I met one of my old friends, D. W. Plume, of Waterbury, who had offered me money and credit to reenter business but who had spurned with indignation my proposition that he join me in the telephone enterprise. He later invited me to his room in the hotel, and, after closing the door very ceremoniously, he turned and asked me to kick him.

In November, 1877, I built a line connecting the mill and offices of the Ansonia Brass and Copper Company. These works were adjoining those of Wallace and Sons, who were also manufacturers of copper wire and by whom I was once employed. It was there that I acquired the knowledge of wire drawing and, very largely, whatever mechanical skill I possess. I asked Superintendent Samuel Cotter to allow me to use copper wire and also to permit me to supervise the drawing of the wire. He replied, "Yes, you can make it of gold if you want to," and thereupon drove me to the wire mill and left orders for them to follow my directions. As wire drawing is an art in which there are no amateur performers that I ever knew of, I selected a man whom I had known in former years as a fine workman. After a day or two of experiment with different sized rods and by drawing carefully through several gradually reduced dies or "holes," a product was obtained which had the desired tensile strength and torsion, or what is known as hard-drawn copper wire.

Soon afterwards I connected all of the mills and offices of this company into a private exchange system with the same material. This was the first hard-drawn copper wire for electrical purposes ever produced and also the first private exchange. I had sections taken down after exposure to the elements one year, two years, three and four years, showing no deterioration, either in conductivity or tensile strength. These samples were, for the most part, sent to Boston, with no results. I tried to induce the Ansonia Brass and Copper Company, as an advertisement, to deliver some of this wire at the cost of iron wire. This they refused to do. One day I met Colonel Fred Mason, president of the Bridgeport Brass Company. He said to me, "Tom, there should be something in your business for us to do." I replied, "There is, but you wire people have got no sand." "Now, wait; listen; I'll do anything you ask me. Now go ahead." I said, "I want you to furnish to any one whom I may designate a quantity of hard-drawn copper wire." I then described to him how it should be drawn. I then saw the general manager of one of our companies who agreed to place an order. I then left for a long trip west. Upon my return, I hastened to see the line, and what do you think I found —that they had strung soft, cotton-covered wire. The cotton was watersoaked and the wire was hanging in festoons from end to end of the line. I sought out the general manager and asked for an explanation. He said he had ordered it in that way, so that if it did not prove in, he could take it down and use it for inside wiring. Although I felt that Colonel Mason never should have consented to have filled the order in that way, I later recommended him to Mr. Vail, as he had suffered a little financially on account of it.

I obtained a promise from the management of the New England Company to run a metallic circuit of copper wire from Boston to Worcester, but they weakened and instead they strung a No. 4 iron grounded circuit. It was about as well adapted for telephone purposes as a boiler shop.

It was incomprehensible to me that, with the proof at hand, the electrical people did not sooner realize the value of this material, that was cheaper than iron in conductivity and practically everlasting. I made every effort to introduce it, without success, until Mr. Vail commissioned me to build an experimental line from New York to Boston. When Mr. Vail spoke to me of the matter I was very much surprised for the reason that I had assumed that it was he who had turned it down, for Dr. Jaques' reports to me were always favorable. In this connection I wish to state that it is very doubtful if at that time any other man in the world would have risked $70,000 in such an innovation. It was not exactly an experiment, as the hard-drawn copper wire had been in use seven years and had been tested from time to time, showing no perceptible deterioration.

Thus it will be seen that the barbed wire brought me in touch with the telegraph, the fare register with Mr. Cheever, Mr. Cheever with the telephone, the telephone with the central office apparatus and hard-drawn copper wire and the endorsement of blank paper took me out of the manufacturing business. This is the first case that I remember where the endorsement of blank paper brought any good to the individual, and still I do not recommend it. However, I formed many acquaintances among manufacturers and wholesale men throughout the country which afterward were of great value to me as a means of introduction to city and state officials. General Hinchman, of the Western Union, remarked that I was the best acquainted man that he had met.

The telephone system is comparable to the sun, in that, for the benefit of the public, it is quite as impracticable to divide it on a state or national basis.

As a matter of fact, with a diagram of telephone lines only, it would be impossible to trace the national line between the United States and Canada.

As I was getting well under way with the exchange in Bridgeport, the Western Union Telegraph Company entered the telephone field and somehow appeared to make a special drive at me. I fought desperately and won out in

divers places. At the Danbury, Conn., fight, one of the Western Union officials said to me, "Doolittle, you are a good fighter, but we are coming to Bridgeport and will do you up if it takes the whole capital stock of the Western Union to do it." I appealed to Boston, but they were nearly as bad off as I. At last Mr. William D. Bishop, then president of the New Haven road and a director in the Western Union, called upon me and, while expressing great appreciation of my enterprise, was sorry that his interests lay in another direction. He than proceeded to order all of my telephones out of the railroad, steamboat and express offices.

Then it was a question of accepting their proposition which was $1,000 less than the business cost me, or trying to maintain a fight in which I was likely to lose everything. I made terms with them by which they agreed, on the side, not to remove the Bell instruments. We agreed that I was to remain in their employ three years, but it was optional with me after the first year. I accepted the situation and the place as a "pot boiler." I had made up my mind to quit the whole business and go back to manufacturing when one day I met Mr. Vail in the corridor of the Western Union building, and he said to me. "Let bygones be bygones. You come over to Boston, take off your coat and go to work." The Bell Company afterwards made up my loss on the Bridgeport exchange.

Upon taking up my work with the Western Union, I devoted all my spare time to get at the fundamental principle of what a switchboard should be and to a study of the problem of providing telephone service in New York City. I based my figures on a possible 50,000 subscribers in the not far remote future (we had, at the time, about 275). I found it impossible to center 50,000 subscribers with any known central-office apparatus then extant. After a careful study of the subject, I fixed upon what I termed "the unit system," which consisted of the signal and jack combined together and set in rows upon shelves in front of the switchboard. Even with this, the wires could not be centered at one point. I then divided the wires into groups, connected with trunks, or into what we now call the multi-office system. That is to say, that exchanges should be simultaneously established in different parts of the city and connected with trunk wires. I did not approve of the multiple system for New York for I could not prove it as an economic measure, even with 50,000 subscribers. At the first meeting of the representatives of the telephone industry, at Niagara Falls, where many kinds of switchboards were shown and described, the only one from my standpoint, showing a correct fundamental principle was exhibited by Mr. Jones of Cincinnati, but in this each unit measured about one inch and a half wide by six inches high. My first experiment was about one inch by three inches; afterwards to one inch by one inch; then one-half inch by one inch; the latter by means of the automatic working steel ball. Later a lamp was substituted for this steel ball, and the space occupied further reduced. I have always been sorry that I did not think of the little lamp.

I kept up an interest in central-office apparatus until it assumed correct fundamental lines of evolution.

In the line of apparatus, two achievements stand out in my memory and make me happier than any other two. One was the development of the long-distance transmitter by A. C. White, and the other when Mr. Hayes told me that the common battery was an assured success.

In looking over the field in the beginning, I met no one who seemed to have a comprehensive idea, or any at all, of the now termed telephone exchange, and, as my ideas on the subject dated back of the invention of the telephone, I felt that I might have some rightful claim in the matter. I therefore prepared drawings, specifications and claims. I went to the patent office with my attorney, W. C. McIntyre, where I sat between him and Examiner Buckingham and discussed the claims. Mr. Buckingham failed to see the patent-ability of the invention, saying that the substitution of telephone for Morse instruments did not, in his opinion, constitute an invention. I tried to explain that there were some combinations that were very unlike the telegraph system, but it was of no avail, and I reluctantly gave it up, accepting whatever he was pleased to allow. Some months afterwards I was passing through the patent office when Mr. Freeman, the chief examiner, accosted me, saying, "Why did you make no claims on that drawing that you left in the files? I have rejected eighteen applications on that drawing and you made no claim for it." "My claims were not allowed," I replied. "Well," he said, "if you had appealed to me, I would have allowed them."

The switchboard shown in this patent was my first departure from the regular Western Union type and was made in the early winter of 1877-78. In this I substituted switches for plugs for convenience of manipulation, but immediately abandoned it after experimental use on the social telephone system.

In our telegraph system, in Bridgeport, we had much trouble by subscribers leaving their keys open. We therefore attached a spring, making a self-closing switch to overcome the trouble.

With this in mind, when I devised the subscriber's call bell, and after a consultation with Mr. Thomas A. Watson, the call bell was equipped with a locking lever in such a way that one end must be down while talking. This was awkward and uncomfortable but was about all that was allowed in the patent. No one ever heard me recommend their use. Later Mr. Williams attached a slide catch on one end of the bell. This brought in all the old time telegraph trouble.

In 1891 I was very much disturbed by the lack of interest in toll lines, for it seemed to me that the best interest of the public, as well as our own, was the development of a national system. I asked President Hudson to allow me to make a specialty of that work. I made up a little department for this purpose, and started a careful study of the whole United States, visiting all the states and cities, making a study of local conditions and trend of business. I was at first discouraged at the lack of interest but afterwards delighted with the aroused interest in this department of the business and with the enthusiasm and zeal displayed by my corps of assistants when they began to comprehend the scope and value of the work. Careful analyses were made of the trend of business from all points. Toll centers were established and a basis of estimate was fixed by the varied amount of toll receipts per capita in different sections of the country.

In 1909 I was retired from active work, and now, as from time to time I peer helplessly into the different departments, I am confronted with the thought that nothing can take from me the pleasure that was mine when I was peering into the future to discover those things which, though crude like the first Bell telephone, were fundamentally right, nor of being associated with the most devoted to their work and kindly set of men that were ever brought together for the development of any enterprise. While the past is interesting for the leisure of mankind, the future holds more for him who can anticipate the requirements of civilization.

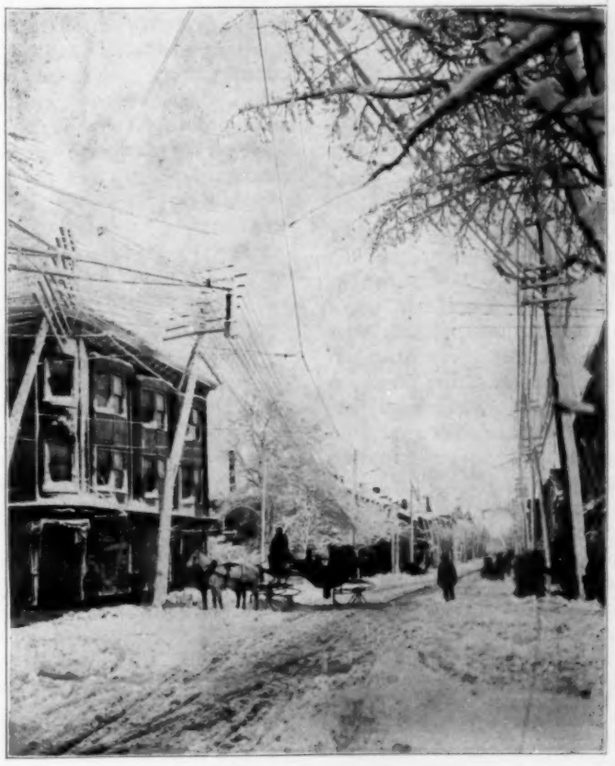
Municipalities and Shade Trees

A Popular Talk on Some Features of Law Not Universally Known Among the Laity

BY WALTER K. TOWERS

THE municipality, be it city, town or village, is given a wide control over the streets within the corporate limits and in addition bears a heavy responsibility in this regard. Not infrequently difficulties arise between the municipal authorities having the streets within their charge and the owner of property facing on the streets. Shade trees are a constant cause of conflict. The property owner may have a fine row of trees along the street and these trees may appear to the authorities to be an obstruction to the highway. The owner objects to their removal. What are his rights? A shade tree may be in the way of a projected sidewalk. Must the tree be removed? The limbs of trees may overhang the street or sidewalk in such a way as to obstruct the public way. May the authorities remove the limbs or cut down the entire tree?

The first inquiry that arises in such cases is as to the legal ownership of the land upon which the trees are situated. Let us suppose that the trees have been planted on a strip between the sidewalk and the curb. This strip is usually a part of the land set aside for the use of the public as a street. A part of it has not been paved but has been set aside for a parkway, or for future need should the paved portion of the street require widening. Thus the trees are, technically speaking, within the street. In perhaps a majority of cases the owners of the property adjoining the street own the land in front of their lots to the center of the street. They may not exercise such complete control over the portion of their ground beyond the sidewalk since that part has been set aside for the use of the public as a whole in passing. In legal phraseology the landowner retains title to the land beyond the street line to the center of the street, but he owns it subject to an easement. That is, he must allow all members of the public to go and come at will, using the way for the normal purposes of a street. He must allow the municipality to control it, pave it and keep it in a condition fit for public use. The owner may not use his property beyond the street line in a manner that will in any way interfere with the passage of the public. There are few practical uses to which the owner may put the property beyond the street line without interfering with its use as a highway and so he comes to regard his holdings as extending simply to the street line.



In not a few cases the municipality does own the street—has actual legal title to it—the owner of the adjoining property having no title. Who owns the street, whether property owner or municipality, is a question of fact in each individual case. This may vary from state to state or even from town to town or street to street. It depends not only on the law of the particular state, but upon the exact rights which the public was given when that particular street was dedicated to public use, or was opened by other means.

If the property owner owns the title to the street he owns the trees that grow in front of his property within the street line. But though he may own the trees this does not prove that the municipality may not insist that they may be removed. The power and duty rests with the municipal authorities to keep the street in a proper condition for travel. If the trees amount to obstruction in the street the municipality may require that they be removed. Trees in the street that are obstructions amount to a legal nuisance and may be removed as such. But shade trees are generally regarded with favor by the law and they do not amount to a nuisance where they do not actually obstruct travel along the street or highway. Not a few cases have ruled that municipal authorities cannot declare trees in the streets to be a nuisance unless they actually do obstruct street travel. Such rulings have been made in such states as Georgia, Iowa, Maryland, Michigan, New Jersey, New York and Ohio. In other states, as California, Illinois, North Carolina and Wisconsin, it has been held that the decision of the municipal authorities in the matter is final. They are in control of the streets and if they rule that a tree is an obstruction their decision is final and the courts of law will not consider the question.

In any state a wide control over the streets by the municipality must be recognized. If the public authorities rule that a tree is an obstruction to the street the property owner had best bow to their decision rather than enter upon involved and expensive litigation, unless the action of the authorities is clearly unfair and the tree in question is clearly not in any way an obstruction to the street.

Perhaps the principal advantage of the position of the landowner who has title to the center of the street is that as he owns the tree he has direct property rights in it. If such is the case the authorities must first notify the owner to remove his tree from the public way. A reasonable length of time must be al-

lowed him to either transplant the tree or cut it down and utilize the timber for his own purposes. If he does not do this the authorities may then remove the obstructing tree and charge the expense against the owner.

A tree which in any way obstructs a sidewalk is as truly an obstruction to the street as though it blocked the wagon way and may be treated in the same manner. If overhanging limbs amount to an obstruction the tree may be trimmed up, or if necessary, removed entirely.

If the municipal authorities remove shade trees belonging to a property owner for a legal reason the property owner has, in law, suffered no wrong. But if the municipality removes trees without legal basis the property owner may recover damages for the loss and injury to his property. If any other parties injure the trees without justification the owner may recover damages in a suit at law. Even though the city hold title to the streets and to the trees in the street the owner of property fronting on the streets still has some rights in the trees. In one case he was allowed to recover from a gas company which had negligently allowed gas to escape from its mains and kill shade trees located in front of the property but within the street, which was owned by the city.

Generally telephone and telegraph companies may be given authority to string their wires along public highways, though the courts of some states do not permit this. In such cases the legislative body may also give authority to trim trees away from the wires in cases of necessity. But generally the companies are given no great liberties in this regard and must raise their wires above trees and otherwise avoid injuring them in every possible way, even though it involves additional difficulty and expense.

Legislatures and city councils may pass regulations to protect trees located within the line of the roads and so enforce these measures as to prevent any damage to the shade trees.

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"Information"

Between midnight and the dawn, when the tide of fool questions is on the ebb flow, the information operator takes five minutes off and dreams. If traffic has been heavy, and if the hotel registers have been full, she merely sighs wearily and wonders how soon the world would stop wagging if the information office were abolished.

But there come times when even the meekness of the information operators is turned to gall. A woman in the West End has just called to find out if there is a night boat to Petersburg; another has demanded to know why the gas lights are dim again, and a third has asked if Joseph Jefferson, who is at a local theater this week, is the same one who used to play "Rip Van Winkle," because if he is there must be some mistake, because that Jefferson is dead. Then it is that little Miss Information sees red and dreams harsh dreams.

If she is endowed with imagination—the telephone company doesn't nominate it in the bond, but sometimes it is there—she dreams of the time when the present generation will be dusted of its ancestors and all people who ask fool questions will wear horns and contend with asbestos imps, while the whole sisterhood of information operators will recline all day long in a land of perpetual afternoon and eat nothing but cocoanut cutlets and chicken ice cream.

The true story of a day in an information operator's life would read like a modernized Job. Compared to her lot, the existence of the corner cop is featureless. People try to make her take the place of the Encyclopedia Britannica, the United States Weather Bureau, the City Directory, and the Query Column. And the funniest thing about it is that she is strictly forbidden by the company to give out any information that doesn't have to do with getting a number.

Here are a few that were fired at the information operators in one exchange last week:

"Please give me the transfer company, I want to have my telephone moved."

"What is the matter with the moon, it doesn't shine bright?"

"At what hotel are the Marathon boys stopping?"

"Why hasn't a man been around to remove the garbage?"

"Is it raining at Fair Oaks?"

"What car do you take to go to Seven Pines?"

"Is there any meat in mincemeat pie?"

"Do you know what time it will stop raining?"

"How much will it cost for a taxi from my house to downtown?"

"If anybody calls my number can you tell 'em I'm downtown?"

"What play is at the Academy tonight?"

"Do you know what time the department stores close today?"

"When will the Marathon race finish, and why is it called Marathon?"

These are a few of the thousands that get turned down cold every day. There are other questions having to do with numbers, that are equally needless. Fully 65 per cent of the requests received by information operators for numbers, according to the district manager, A. S. Tanner, of the Chesapeake and Potomac Telephone Company of Virginia, are for numbers listed in the telephone directory.

But information has nothing on the complaint desk at telephone headquarters. The other night a woman at one of the hotels caught Complaint somehow, and sent a Pankhurst request quivering over the wire. She was kicking because the maid hadn't left any towels in her room. The telephone people have sent this complaint along to their official journal, to go at the top of the column.

And no one can blame Miss Information for balking at these:

"Do you know where you can dig good angleworms?"

"How do the owl cars run from Broad and Eighth?"

"Is 'Damaged Goods' a musical comedy?"

"Can you mail a letter for one cent if you don't seal it?"

"What's the best hotel in Norfolk?"

"How many presidents were born in Virginia?"

"How far is it from Richmond to Bremo Bluff?"

"Is 'ish gebibble' the same thing as 'I should worry'?"

A German physician has induced artificial sleep by means of an electric current, the sleep lasting as long as the subject was under the influence of the current. Animals were put to sleep in a few seconds and kept in this state for days without any visible harmful effect. When the contact with the current was removed, the animals arose and went on to eat their interrupted meal as if nothing had occurred.

European Telephone Development

Translations from the Foreign Press and Communications from European Engineers

BY FRED W. SCHOLZ

THE following investigations of efficiency of different selectors in groups were made with the intention of working out some sort of a system which could be used to determine how many selectors to put into a group. The basis of the computation starts from *C*, any desirable point in the exchange office. All calls come from the outside office over a cable *A* with *x* number of wires. From the distributing point *C* the calls are transferred to the different points *B*, of which there are ten in our example.

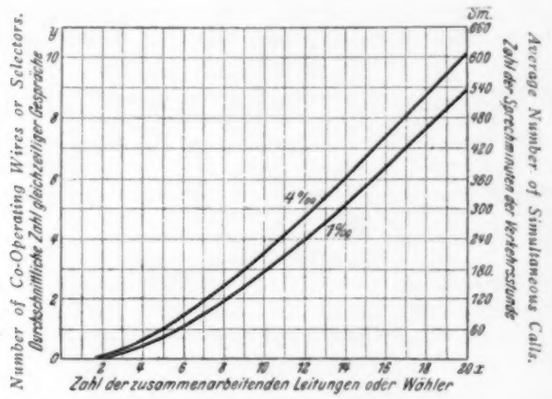


Fig. 1. Number of Lines or Selectors Working Together.

For this purpose cables with x_1; x_2; x_3.....x_{10} wires are passed from *C* to B_1; B_2; B_3.....B_{10}. Let us suppose that *x* is just large enough to pass the calls from *A* to *C*. Then it is clear that $x_1+x_2+x_3....+x_{10}$ must be greater than *x*, if we demand that every cable *C-B* should have as great an efficiency and carry on its conversation with as much safety against interruptions and busy lines as does the main cable *A-C*. Detailed studies will always be able to show what proportion of calls every cable must carry on the average. Such computations will only show the averages, though, and the number of conversations per time unit can far surpass this average figure at any time. In order to be able to estimate the necessary number of wires in a cable we must apply the laws of probability.

It may be mentioned at this point that for all computations we must assume the busiest time in the day. Of great importance is not only the number of calls, but also the duration of each call. The product of these two factors, the "speaking time in minutes," we will designate by *Sm*. Since most statistical figures are for hour periods, *Sm* might also stand for hour. If we desire a cable of wires, from which we demand an efficiency of 1,000 calls per hour of two minutes each, we must compute $Sm=2000$. In each minute there will be $\frac{Sm}{60}$ calls. If the uniformity were absolute, we would have an efficient number of conductors with the number of conductors $y=\frac{Sm}{60}$. Within this hour the calls will not be regular, however. The number of connections at any time will always differ from the average *y*. If the variation from this average is influenced by accident only, which is usually the case, the average deviation is the square root of $y=\sqrt{y}$. We will then require more than *y*-number of lines, and we assume a cable of size *x*, which can accommodate a number of conversations equal to $y+n\sqrt{y}$ at any time. The greater we select *n*, the smaller is the probability that all the lines will be busy at the same time. This probability will be according to law; 16 per cent for $n=1$; 2.3 per cent for $n=2$; 0.13 per cent for $n=3$. For the given case with the small values of *y*, with which we have to deal, the law of exponential fallacy must be corrected, since *n* with decreasing *y* does not remain constant, but rises, as Table 1 shows.

Table 1. Values of n Depending on y.

y =	1‰	2‰	3‰	4‰
1	4.74	4.32	4.13	3.97
2	4.28	3.96	3.75	3.61
3	4.08	3.78	3.58	3.44
4	3.97	3.65	3.48	3.39
5	3.88	3.58	3.41	3.28
10	3.66	3.39	3.22	3.10
15	3.58	3.30	3.14	3.04
20	3.53	3.26	3.11	2.99
40	3.38	3.15	2.99	2.88
60	3.34	3.10	2.95	2.84
80	3.30	3.08	2.93	2.82

Table 2. Values of x, depending on y.

y =	1‰	2‰	3‰	4‰
1	5.74	5.32	5.12	4.97
2	8.06	7.60	7.30	7.10
3	10.07	9.55	9.20	8.96
4	11.92	11.30	10.96	10.70
5	13.68	13.01	12.63	12.34
10	21.58	20.70	20.18	19.80
15	28.87	27.77	27.15	26.78
20	35.80	34.60	33.88	33.38
40	61.37	59.90	58.90	58.20
60	85.90	84.00	82.82	82.00
80	109.50	107.60	106.20	105.20

The tables are computed for the probabilities 1; 2; 3; 4 per cent; i. e., of 1000 calls, one, two, three and four will find the lines busy. The diagrams 1 to 4 are drawn for 1 per cent and 4 per cent. The following computations and examples are based on the lower (1 per cent) curves only, as one busy wire per 1000 calls seems to be an average capacity.

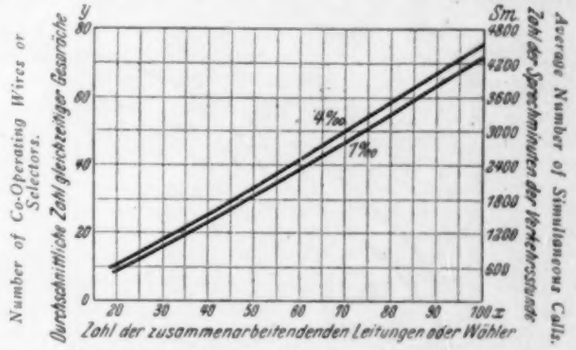


Fig. 2. Number of Lines or Selectors Working Together.

With increasing values of *y*, the number *n* approaches a limit where it remains constant. For $y=80$, $n=3.3$, and for larger values we can figure $x=y+3.3\sqrt{y}$. For smaller values, the diagrams show the necessary values. Fig. 1 shows $x=1$ to 20; Fig. 2 for $x=20$ to 100 lines. On the right side of the diagrams, the ordinates give $Sm=60y$. In the diagrams Figs. 3 and 4, the ab-

scissae are the same as in 1 and 2, but the ordinates represent the values $u=Sx$; i. e., with the size of cable x, every line is busy u minutes per hour. The magnitude u we would call the capacity per hour. The busy line expression $\propto$ we obtain by dividing u by 60; or alpha $(\propto)=\frac{u}{60}=\frac{Sm}{60x}=\frac{y}{x}$. The diagrams 1 to 4 give a good means to determine the necessary lines per cable. Take as an example that $Sm=4300$ for the line A-C. From curve 2 we see that the necessary number of lines is $x=100$. Assume for the sake of simplicity that all calls are evenly distributed over all the lines C-B. Then we will have on every line: $Sm=430$; from the curve Fig. 1 we see that $x_1=x_2=\ldots x_{10}=17$. Whereas, therefore, 100 pairs of wires are sufficient to convey the calls from A to C, we need $10\times17=170$ pairs of wires to relay the same calls further on to the ten points of B. With non-uniform distribution, the process would be the same; if $Sm=180$, or 540 for the two distances $C—B_1$ and $C—B^2$, then $x_1=10$ and $x_2=20$.

What was said here about the wires themselves can also be said just as truly of the selectors in the automatic system. C will then represent a selector group or line switch unit. The lines coming from A are then connected with the movable parts of the selectors. From the first selectors the wires pass to the second selectors, and so on. Usually the bundles of wires of the line A-C, as also those of C-B, are subdivided into several smaller bundles of wires. The pairs of wires in each bundle work in such a way that a call coming over this one bundle, finding its wires busy, selects another pair of wires of the same bundle. Pairs of wires of the different bundles cannot replace each other, and for the call in question it is immaterial whether there are free wires in the other bundles of the same main cable or bundle.

In order to understand the importance of this subdivision into bundles we use Fig. 1 as an aid. A bundle with 20 lines, which is not divided into bundles, can accommodate $Sm=540$, while the same bundle, subdivided into two distinct bundles of 10 lines each, can only accommodate $Sm=2\times180$, or 360. In systems where the multiple arc of the selector has ten contacts, the size

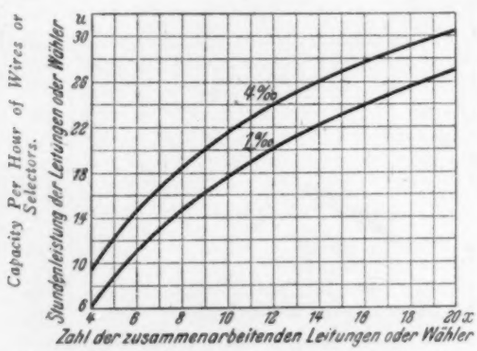


Fig. 3. Number of Lines or Selectors Working Together.

of bundles is 10. If we assume that C represents the first selector group, and B the second selectors, we must have $x_1=\frac{10.430}{180}=24$, in order to permit $Sm=430$. The 100 pairs of wires in a bundle $Sm=4300$ require therefore, in fact, $10\times24=240$ wire pairs in order to accommodate the same number of minutes of conversation to the ten different sections of the second selector group. This same system can be used to compute the selectors and connectors. If, in the Strowger system, every one of the 100 subscribers is to be called once per hour, and the call lasts 1.5 minutes, we have $Sm=150$ for this selector group. Curve 1 shows that in this case 9 selectors are sufficient per 100 subscribers.

We will now examine the curves 3 and 4. The ordinates represent the capacity per hour of lines and selectors. This figure refers to the size of the selectors and is a good method of determining the number of selectors, knowing the time per call, and the contact size per selector arc or switch unit. The selector number per group is $N=\frac{Sm}{u}$, when Sm is the total capacity per hour of the exchange and u is the capacity per hour per selector group.

As example we will here take a Strowger automatic exchange, using first and second selectors of the Siemens-

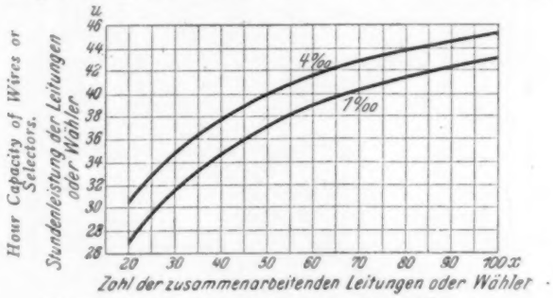


Fig. 4. Number of Lines or Selectors Working Together.

Halske system. We have an isolated exchange with 4000 subscribers. Every subscriber calls on the average 8 times a day, once per hour, talking 1.5 minutes. For the entire exchange per traffic hour we have:

Sm $1.5\times1\times4000=6000$.

1. First selector $N=4000$.

2. Second selector, size of bundle of wires between I and II selectors: $x=10$ for the II selector $u=18$. $N=\frac{6000}{18}=333$.

3. I group selector; size of bundle of wires between II selectors and I group selector, $x=100$; for the I group selectors, $u=43$. $N=\frac{6000}{43}=140$.

4. II group selector; size of bundle between I and II group selectors: $x=10$ for the II group selector, $u=18$, $N=\frac{6000}{18}=333$.

5. Connectors: These are divided into 40 groups for every 100 subscribers. For 100 subscribers $Sm=150$. From Figs. 1 and 3 we see that $x=9$ and $u=16.7$, then $N=\frac{6000}{16.7}=360$.

The following figures of capacities for the selectors in this exchange will be:

	Number.	Capacity per Hour.	Daily Capacity.
I. Selectors	4,000	1.5 min.	12 min.
II. Selectors	333	18 min.	2 hrs. 24 min.
I. Group selectors	140	43 min.	5 hrs. 44 min.
II. Group selectors	333	18 min.	2 hrs. 24 min.
Connectors	360	16.7 min.	2 hrs. 13 min.

The above example assumed for the sake of simplicity that the distribution of calls was uniform. Where

this is not the case, the computations have to be subdivided still further.

After discussing the capacity of a single group of selectors and units, it may be interesting to discuss the capacity of an entire exchange. This is best expressed by Sm. When Sm for two exchanges of the same type of automatic systems is the same, the exchanges should have the same efficiency. This presupposes that they work with the same factor of safety (1 per cent). The figure $y = \frac{Sm}{60}$, which represents the average number of simultaneous calls, can also be used as a measure of efficiency and capacity. In the above example the capacity for the exchange will be Sm=6000 and y=100.

When we assume a safety factor of 1 per cent we mean that of every 1000 calls one is without success. In a five selector Strowger system we have five selector groups, and 5 calls per 1000 calls are in vain. For six selectors, we have 6 per 1000, and so on. The total safety for the exchange decreases with increasing number of selector groups. In this relation, systems with smaller selector groups are superior to those with larger. It is not necessary, however, to assume the same factor of safety for the different groups. The requirements for

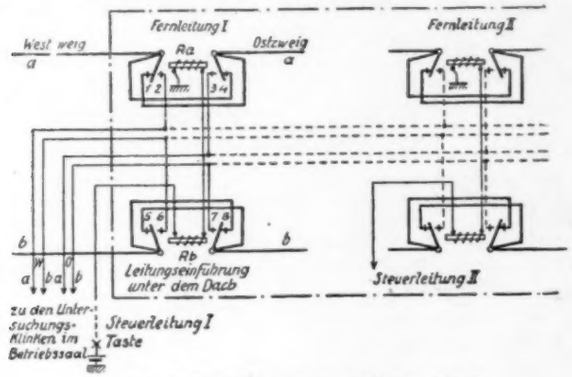


Fig. 5—Testing Relays in Telephone Lines.

safety in these relations cost money, but their cost differs in the different groups. If, in the example, we were to compute the safety factor for the I group selector with 4 per cent instead of 1 per cent, we would require 133 instead of 140 selector. The saving would only be 5 per cent. In the group of the connectors, however, we would reduce from 333 to 272 selectors for the same ratio, a saving of 18 per cent. The selector numbers computed here can be somewhat varied, depending on local conditions. Opinions will also differ as to the safety factor. In general the estimates are correct, however, and can be used in practice for exchanges.—P. V. Christensen (Kopenhagen), *Elektrotech Zeit.*

CHANGE OF CURRENT SUPPLY FOR MICROPHONE.

Telegraphen und Fernsprech Technik brings an article on the change of current supply for microphones from the main or long distance exchange to the subexchange or local exchange with simultaneous pupinization of the multi-office trunk lines. The greater distances between subscribers and exchanges bring with them an increased damping effect. This is not always due to the greater damping exponent of the subscriber's line, which grows with increasing length. Especially where the common battery system is used, we find added trouble in that the resistance of the subscriber cable increases, and the relative influence of the resistance changes in the microphone on the total resistance of the subscriber circuit current becomes smaller. The result is a drop in the amplitude of the alternating current and thus of the current passing into the long distance lines. In order to remedy these conditions it is necessary to shorten the subscriber cable, i. e., to bring the long distance line nearer to the subscriber by changing the current supply for the microphones from the long distance to the local exchange. At the same time the trunk line connecting the main and the local exchanges must be brought to a capacity approximately equal to that of the long distance line, which can be done by pupinizing the inter-office cables, bringing them as near to the characteristic of the overhead line as possible. In order to test out the feasibility of this plan, the Siemens-Halske Company has made extensive tests in Berlin.

The damping effect of the cables tested varied between βl=2 to 3. When changing the current supply from long to local exchange on one side only, there is no improvement in the quality of conversation until great distances are reached. If the microphone current supply is brought nearer to the subscriber by 12 km. the gain in damping effect is about βl=0.5. The damping effect is greatly reduced when pupinizing both lengths of cable. If the distance between subscriber and long distance station is 15 km. and if both lines are pupinized, the damping effect is reduced by βl=1.5. The influence of this process is very small though, when the voltage of the storage battery is increased from 24 to 72 volts. Only at a distance of 15 km. between subscriber and exchange do we find an improvement in conversation with an improved damping effect of 0.2 to 0.3. The change of current supply will give the best results when this change is made both on the transmitting and the receiving exchange. If the distance between subscriber and long distance exchange is 15 km., the damping effect can be reduced by 1.5 to 2 by bringing the current supply nearer by 12 km. and pupinizing both cables.

Further tests treated the influence of the characteristic of the lines connected to the cable on the clearness of conversation. A Pupin line with characteristic Z=2000 was used; an ordinary overhead line with Z=600 and a subscriber cable with Z=500. The inter-office cable in one case was slightly pupinized (Z=1600); the second time stronger (Z=2400). The result of the comparative test is interesting. The greatest gain βl=1.5 can be obtained when a Pupin line is connected similar to a distance line, for in this case the characteristic of the connected lines is practically the same and very high (Z=2000, 2400, 1600). When using ordinary wires with Z=600 and connecting to the pupinized cable, we reach an improvement in damping effect of 0.5 to 1.0. The magnitude of the characteristic of the inter-office cables has no effect. The ordinary subscriber cable, of course, is not used for long distance transmission. If they were used, though, the pupinization of the inter-office cables might improve the quality of conversation; the sounds, but not the loudness of the tone. If ordinary subscriber cables are used for longer transmission, the influence of pupinization of the inter-office trunk cables is felt with longer distances only.

PROTECTING POLES AGAINST DECAY.

The following process of protecting poles may be used either with creosoted and treated poles or else with the untreated poles with equal success. It consists in

protecting the pole near the surface by means of rail lengths. There are two points at which most poles are endangered, i. e., at the top and at the base. In order to protect the top from rain water collecting there and then decaying the tree at that point, a small metallic cap is fastened around the top whose sloping sides allow the water to flow off. At the base the poles are surrounded by steel bands, about 5 feet long, 6.4 inches wide and 0.3 inch thick. The broad end is somewhat curved to fit more snugly to the pole. Every pole has two curved rails bolted on opposite sides, the bolts running through the pole above ground. The rail runs about 3 feet into the ground and protects the pole from decaying at that point. The steel rails cost about $4 per pole. The steel bands are supposed to have a life of about 20 to 25 years. This system seems to be especially desirable for untreated poles and also for treated poles in places where the ground conditions are unfavorable and where there is excessive dampness.—*Elektrotech. Zeit.*

TELEPHONE COMMUNICATION OVER LONG DISTANCES.

At a recent meeting of the Elektrotechnische Verein Herr Reiss spoke on new methods of long distance telephone transmission and mentioned a system whereby he has obtained clear conversation over distances from 1200 to 1500 miles. The apparatus is supposed to be used in several of the Berlin exchanges and to increase talking currents to twenty times their usual magnitude. The device consists in the main of a gas discharge relay, which is similar to a mercury vapor lamp in its appearance. The construction of this relay is rather expensive, but the improved communication and great distance reached will probably offset any added costs. With the use of this relay, communication on present lines is very much improved, and new lines will not need to be built with wire of the usual cross section, but will give the same efficiency. The communication with the relay over 1200 miles is just as clear as communication without the relay over 600 miles. In general the principle seems to be as follows: In a high vacuum glass tube is an anode of aluminum wire, a cathode of platinum wire, with a layer of barium oxide, and in the center, reaching over the entire tube cross section, is a perforated auxiliary electrode. The cathode is heated by a heating current at 30 volts. Anode and cathode are fed by direct current. The auxiliary electrode opposes its resistance to the evolution of gas between anode and cathode. If this resistance is changed through various tensions, the current between anode and cathode also changes proportionately. It was shown that between two certain values of a slight resistance change of the auxiliary electrode, the corresponding change in the telephone current was very great. If the resistance of the electrode is kept constant within these limits, and the tension of the telephone current to be strengthened passed through the relay, we have corresponding variations in the strength of the telephone current. The telephone current is therefore increased by the relay. If we use several of such relays, the effect is even better. There do not seem to be any difficulties in placing these relays into the existing telephone lines. Details of the relay were not published, but will probably appear in the technical papers within an early date.—*Zeit. f. Schwachstrom.*

SPECIAL TESTING RELAYS IN TELEPHONE LINES.

In order to permit rapid removal of faults in telephone line trouble the German Reichspost is using special relays, which are here shown in Figs. 5 and 6. The diagram shows that there are two relays *Ra* and *Rb* for every line to be tested. These are connected to a control wire *1* in the exchange room. The telephone current branches are connected to the relay contacts in such a way that with currentless position of the two relay armatures, they are connected directly with each other. In order to assure a high degree of safety to the line connection at the points of interruption, we have in the *a*-branch the back contacts *1* and *4*, and in the *b*-branch the back contacts *5* and *8* placed in parallel.

If from the operator's room current is sent into the control wire, the relays *Ra* and *Rb* attract their armatures, whereby the lines *a* and *b* of the two telephone branches are connected to the test or control lines *2*, *3*, *6* and *7*, which are connected to the working contacts. After completing testing, the lines are again changed back to their proper position for telephoning by interrupting the current. Such relays can also be used in the testing boxes found throughout the country, where it would be too expensive to run a line through the exchange in a small community. Fix 6 shows such a diagram for a relay to be used in field work. In this case a special line is run from the exchange to the line pole to be tested, into which the switch system S_1 and S_2 is placed. By sending current impulses by means of key t_1 the arm a_2 is sent from S_2 to the contacts *1*, *2*, *3*, etc. These contacts are connected with the testing relays *RaI*, *RbI*, *RaII*, *RbII* of the different lines *I*, *II*, etc. At the point of rotation of arm a_2 is the test line coming from

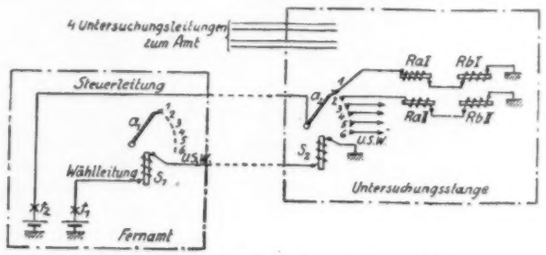


Fig. 6—Testing Relays in Telephone Lines.

the exchange. Using the selector line (*Wählleitung* in the figure), the arm a_2 is switched to the contact, to which are connected the two relays of the line to be tested. Then the relays are operated by working key t_2 and thus the telephone line is connected to the control wires in the exchange. The switch system S_1 at the exchange runs synchronous with the field switch S_2 and shows through its position at the exchange where the arm rests at the test pole. As switch in this sense we might use a selector switch with 10, 20 or more contact points, which, however, must not return to the rest position automatically.—*Elektrotech. u. Maschinen.*

Nickel First Telephones for Philadelphia

Fifteen thousand prepayment telephone boxes, such as already are in use in some parts of the city, will be introduced within the next 18 months by the Bell Telephone Company of Philadelphia, Pa., in place of the present type substation boxes. The change will be made at an expenditure of more than $250,000.

Trials conducted with more than 600 of the new boxes have convinced the company that the device merits universal adoption. According to an officer of the Philadelphia division, all sorts of complaints, retardation in service and the substitution of slugs for coins have practically been eliminated by this latest coin box.

The Lay of a Layman

Just a Few Plain Thoughts on Some of the Aspects of the Telephone Business

BY THE T. E. DOPESTER

A MAN drifted into my sanctum a little while ago and remarked that the telephone business would come back. It is needless to add that the speaker was an independent telephone operator. He differed little from other independent telephone operators. As I sit here and contemplate the tail end of the glad year of nineteen thirteen, I recall a certain meeting held in the Blackstone Hotel, Chicago, where telephone operators met once upon a time. It was an unusual and mixed meeting where the self-elected "little fellow" met his self-styled Big Brother. And it has been amply demonstrated since then that the Big Brother put it all over his little visitors. No one will ever know just why the "little fellows" laid down, following that memorable meeting. Everybody knows that the independent telephone operators lapsed into a long, hypnotic slumber following the face to face contact with Theodore N. Vail and his associates. Maybe it was the shaggy eyebrows or the long, white, venerable locks that adorn Mr. Vail's massive brow. His great bulk would hardly wield such far-reaching influence. Nowadays men have slight fear of sheer weight. Whatever happened, the independent operators returned to their respective homes and entered upon a Rip Van Winkle snooze that threatened the old record.

* * *

Co-incident with the hotel episode, the Big Brother dug deep into his reserves and engaged in an awe-inspiring advertising campaign that emphasized the greatness of a certain telephone system — ample within itself, according to the dope, to accommodate all the people. Something less than $400,000 a year paid the heralds that sung the virtues of a universal system—Big Brother's great grid of wires. Meantime the little fellows kept on with their snooze. It was easier to throw in the busy signal than it was to put up the connection. Besides, to make Big Brother's system tally with his announcement, wouldn't he have to wake us up and buy ours? That was the presumption. It has been running along like that for quite a spell.

* * *

It was John H. Wright of Jamestown, N. Y., who awoke first among those who were inclined to sleep. John Wright was an old newspaper man before he engaged in operating an independent telephone system. Newspaper men are poor sleepers and some of them are bully thinkers. John Wright found that the short nap was invigorating. He was probably the last man you would pick out of a crowd to undertake the big job he planned himself. He concluded that Big Brother wasn't playing the game according to the original proposal. Big Brother never meant to come across with the wherewithal to buy the Home Telephone Company. Come to think it over, the Jamestown plant wasn't for sale at any price. It was established in an inland city of the third class, to be sure, but it was a first-class system with a first-class clientele and had some rights in the premises that should be considered. So John Wright started his campaign. He didn't make a high dive into his barrel and come up with four hundred thousand dollars to spend in national magazines. His was a universal Jamestown system—purely a local proposition. So he got his local fellows together and lodged a joint complaint against Big Brother. That was on election day two years ago—election day being a good day to elect. The complaint received active and dignified attention of the federal authorities. Washington has known for two years at least that Jamestown was third-class for the census, but first-class for the senses. John Wright through his activities found that the attorney-general of the United States was just plain folks and that Big Brother had no terrors for either of them. John Wright kept buzzing around like a big bottle fly and he mussed up the ointment as he went along. Pretty soon the department of justice had a look at the John Wright matter and lo and behold, Big Brother anticipating trouble, has thrown up his hands and says: "I'll be good."

* * *

When the American Telephone and Telegraph Company said it would stand hitched, my friend the independent telephone operator woke up. He concludes that competitive telephony is here—that it is a business that is coming back. The files of this magazine will betray no evidences that the telephone business hasn't been here all the time. There have been years and years of extravagant warfare between the independents and the Bell companies, but during those years the telephone system of the United States has grown to amazing proportions. We have twice as many telephones as all the rest of the world. We are clearly entitled to the medal as telephone blab artists. This has meant tremendous telephone business all the time. I cannot see it as a comeback proposition.

* * *

But with half an eye, I can see how the independents will have a better show, now that they are wide-awake again. They will go ahead with the development of their systems, caring for that waiting list and the insistent demand that follows the growth of every community. The replacement factor of the present system insures constant revenue for the manufacturer. The extension of operating units means more revenue for the exchange. Investors will look upon the business with better grace when they learn that the rights of competitors will be respected. There will be less of destructive warfare. The federal government seems to be wield-

Remember Courtesy is the Cheapest Thing in the World—Govern Yourself Accordingly When Talking to Customers

The tone of your voice over a telephone will make either a friend or an enemy for your firm. If you were talking to a customer face to face and you let a tone of impatience creep into your voice, he might overlook it because of the friendlier aspect of your face. But over the telephone let the slightest suspicion of indifference creep into your tone and the firm will suffer. If the customer is impatient or unreasonable you should have patience enough for two. When you tell him you cannot do what he wants, take plenty of time to tell him *why* you cannot. *Always* have a smile in your voice when talking over the telephone.

ing an influence that is relished by all sensible business organizations. That this influence has been felt by the largest telephone operator in the world is good reason for John Wright and his fellows to rejoice.

* * *

TELEPHONE ENGINEER has believed in and advocated sane competition in the telephone business during the five years of its existence. It is particularly gratifying to its editors to learn that the Bell system will not acquire in future either "directly or indirectly, through purchase of its physical property or of its securities, or otherwise, dominion or control over any other telephone company owning, controlling, or operating any exchange or line which is or may be operated in competition with any exchange or line in the Bell system." While our mission of usefulness has never been doubted, there seems to be much for thankfulness in such a statement. Here is offered every reason for a continuation of competitive telephone system.

* * *

But to my feeble mind and limited capacity of observation there isn't a thing in this entire "overture" that will prevent my friend Buck Stanley from selling his telephone system to the Bell company, because Buck's exchange isn't a competitive system in any sense. The Bell has a single toll station in Buck's town, but that is all. That single Bell instrument is part of the Bell's universal system. When Buck Stanley's subscribers want to talk to Chicago or Toledo or Indianapolis they go over to Fred Irvin's drug store and fix it up with Fred. I'm sure the present arrangement is satisfactory to Buck's subscribers—that they won't insist on the interconnection arrangement, but should that contingency arise, or should the Bell care to have Buck's system, there doesn't seem to be any obstacle in the way for negotiations toward that end. The time has arrived when independents know more certainly where they are at, because they have the black and white declaration of their big rival, but in cases like Buck's wherein does the present Bell policy differ from the old Bell policy?

* * *

President Wilson unequivocally endorses the Bell move but Attorney-General McReynold's qualifies a bit. Most of us want to take Mr. Kingsbury seriously. We want to believe that the Bell will cease buying independent properties; cease advocating a single telephone system in the prints and building competing plants on the map. That the Bell should drop Western Union is to be regretted. When it shall drop its manufacturing auxiliary we will all rejoice.

* * *

But it is evident that the independents will have something new to amuse themselves with and that the coming conventions will develop many new points of interest. There is one thing that the conventions should do if they do nothing else—kill off the impression that certain publications are "official organs." If telephone associations shall merit the endorsement of the trade press they should make it very plain that they are playing no favorites.

* * *

Mr. Kingsbury wrote to Mr. McReynolds on December 19. Mr. Whitney wrote to Mr. Fortune December 16. Mr. Kingsbury tried hard to say that Bell wouldn't. Mr. Whitney tried hard to say that the Bell would. Mr. Kingsbury was talking for the whole country. Mr. Whitney was confining himself to Indianapolis. Whom are we to believe? Or shall we rely upon the difference in the dates of these two letters which contradict each other?

* * *

The Ohio Utilities Commission is asking for six more Cleveland witnesses in the proposed merger case to be heard at Columbus January 6. Will Cuyahoga and Cleveland Telephone get together or not? Why continue a merger case in the face of the Kingsbury statement?

* * *

Shall we expect that the government notion of telephone ownership be now discarded?

* * *

It is always safe to presume that we'll hear from Pop Reynolds at least once a year. He scored about the middle of December, bringing with him the old, old story that the Great Eastern Telephone Company owns franchise and will build an independent telephone plant in New York. The "Great Eastern" put a cable across the Atlantic Ocean—mere child's play compared with the job its namesake has planned for itself. Even so Pop Reynolds says he'll do it and he's been saying that for many years.

* * *

The federal quiz at Denver has disclosed one Mary Stewart, a stenographer, who purchased something more than half a million dollars' worth of the stock of the Interstate Consolidated Telephone Company of Portland, Oregon. And yet we are informed that times are hard in Denver.

* * *

Before we are through with the Inter-State Telephone and Telegraph Company of Aurora, somebody will have to do one of two things—prove the nasty charges or get hurt. Seventy-eight bondholders of the Inter-State company have instituted a suit against Hank Evans and Bernard Sunny and several Bell companies, alleging all sorts of things. These seventy-eight bondholders, owning $778,000 in securities of the Inter-State, claim they were flimflammed and they are very positive in their allegations. The complainant bill was filed in the circuit court of Cook county.

* * *

Meantime Thaddeus S. Lane's troubles in the far northwest would fill a book if attempt were made to chronicle them. His chief occupation, judging from the newspaper clippings, is denying things. That he is one of the best you ever knew goes for granted.

* * *

The public service commissioners of New York have authorized Bert Hubbell's scheme to sell preferred stock in the Federal at easy payments and small blocks. The Federal wants its subscribers to own its seven per cent preferred—the more subscribers the merrier. It is demonstrating the community plan and should work wonders for the telephone company.

* * *

American Telephone and Telegraph Company—the great big optimist of business conditions—declares its year's income for the year 1913 will flirt with the tremendous total of $220,000,000. This is approximate gain of ten per cent over the previous year. Why then should I agree with any one who says the telephone business is "coming back"?

* * *

It pays, sometimes, to have competition, even among independent telephone associations. Please refer to the paid announcement of the declaration of principles—the National Association, page 7, advertising section, this issue.

The Audion as an Amplifier

A Paper Read Before the Institute of Radio Engineers at New York

BY LEE DE FOREST

The improved audion, containing one hot and two independent cold electrodes, is described, and its action as a sensitive detector in radio-telegraph and telephone work outlined. Its action is shown to be not that of a simple rectifier or valve, but of a true relay device. The secondary circuit of a wireless receiving transformer is connected in shunt between the "grid" electrode and the filament. The telephone receiver and dry battery are connected between the plate electrode and filament. There appears to be no known limit of sensitiveness below which the effect of minute received energy fails to be registered. The normal current across the gas is of the order of a milliampere, and positive or negative charges impressed upon the grid causes a diminution in this current. The audion as an amplifier of minute telephonic and other currents is described, together with circuits which permit successive amplifications up to 120 times the initial energy. A solution is thus promised of the telephone relay problem, and a sensitive and reliable calling device for wireless purposes is readily attained. The general use of magnetic telephone transmitters in place of microphones, together with smaller telephone cables, is suggested as a possible future development in telephony. In connection with the telegraphone the amplifier permits voice and music records, of practically any length, to be heard throughout large-sized rooms. Recording of rapid wireless signals by means of the telegraphone is thus feasible. It is suggested that the audion amplifier may be applied equally well to problems of cable receiving and relaying.

NOTWITHSTANDING the now widespread use of the audion as a detector in radio-telegraph and telephone service little independent research into the nature of this instrument, or even cursory description of its operation, seems to have been recorded, since my original paper presented in 1906. At that time pending patent applications prevented a detailed description of certain forms and improvements which are today common knowledge among radio engineers. It is my purpose herein to outline briefly the subsequent development of the audion, both as a wireless detector and as amplifier of minute electric impulses.

For the benefit of those not familiar with radio detectors a brief description of the audion follows:

In a small incandescent lamp bulb with a tantalum filament *F*, Fig. 1, of from 4 to 15 volts, is mounted close to one side of this filament and parallel to its plane, a small plate of nickel *W*. This plate is connected through a telephone receiver, or other indicating device *R*, with the positive terminal of a battery of dry cells *B*, arranged with multi-point switch to give from 15 to 40 volts. The negative terminal of this battery is connected to one leg of the filament, which latter is lighted from a suitable storage battery, *A*.

Between the filament and plate is mounted a third el ctrode, G, usually in form of a grid-shaped wire, or a perforated plate. Approximately 1-16 inch separates grid from plate on one side, and from filament on the other.

When used as a wireless detector this grid electrode is connected to one terminal of the source of received high-frequency oscillations, the other terminal being connected to the audion filament at *P*.

In the unlighted bulb resistance is practically infinite between the electrodes. When the filament is at white heat a resistance of from 10,000 to 30,000 ohms is found between this and the cold anode. This resistance depends upon a variety of conditions, such as filament temperature; size, shape, condition and location of the two outside electrodes; amount of impressed E.M.F. across the gas; degree of vacuum; nature and degree of purity of the gas; magnetic forces to which the ions are subjected; and the instantaneous value and sign of the electric potential impressed, or residing, on the intermediate, or grid, electrode.

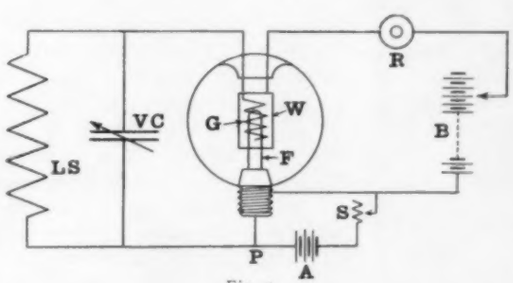


Fig. 1.

The introduction within the exhausted bulb of this third electrode (preferably, but not necessarily, located between the filament and anode plate) at once placed the audion in a class distinct, both as to sensitiveness as a responsive radio detector, and as to its mode of operation. No longer by any form of argument could the grid audion be classed as a rectifier, or "vacuum valve." Attempts to confuse it with the so-called Fleming "valve tube" have, I believe, failed to convince anyone who has actually compared these two detectors, when each is properly constructed and connected, as taught in their respective patent specifications. The difference observed in their operation is more than merely one of degree.

The vacuum valve, as first discovered by Edison and carefully studied by Elster and Geitel, has most marked rectifying properties, excelling in efficiency any electrolytic or crystal rectifier.

In this original device the cold electrode, or electrodes, was connected to the positive terminal of the filament for what may be, under favorable conditions, a very energetic bombardment of negatively charged corpuscles from the negative portions of the filament, while itself giving off practically no negative carriers. This valve rectifies small currents of any frequency, and can therefore be used in connection with a continuous-current galvanometer to detect and measure the half oscillations impressed on a tuned high-frequency transformer, the secondary terminals of which are connected to the anode plate and to one end of the filament, respectively.

Starting from my experiments with the rectifying qualities of a gas flame (where the sources of heat energy and of the impressed E.M.F. across the electrodes were distinct and separate), the writer early found that if this incandescent filament vacuum-rectifier were provided with a secondary battery, of proper voltage, independent of the lighting source and connected between one leg of the filament and the plate (which plate must *always* be made anode), then the device became more than a sim-

ple rectifier. It took on the nature of a true detector, a "wave-responsive" device. In other words, it became to a degree a "trigger" tube, a genuine *relay*, giving responses in the indicating instrument, which was now preferably the telephone receiver, of considerably greater intensity than could be had from the simple rectified received currents. The regular and steady departure of negative ions, or carriers, from the cathode under stress of the B battery was found subject

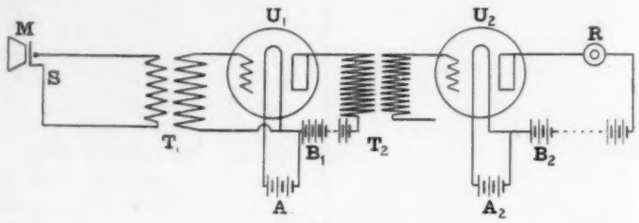


Fig. 3.

to sudden and great variations, following the variations of the applied high-frequency E.M.F., the degree of sensitiveness depending, for any given bulb, upon the heat of the filament and the amount of this applied "B battery" voltage. At once the old vacuum valve took rank in sensitiveness with the electrolytic detector, until that time the most sensitive known.

The next step in advance was, as above stated, the introduction of the electric impulses into the gaseous medium by means of a third and independent electrode. This grid and filament connected across the condenser of an oscillating receiving circuit adds a slight capacity and very high resistance shunt to that condenser. The additional damping thus introduced in the oscillating circuit is excessively small, its resonant qualities are unimpaired. The audion thus lends itself, far more than any other form of energy-transforming detector, to sharp tuning. I have found properly designed receiving circuits equally sharply tuned, whether the audion or the make-and-break contact detector (Poulsen *tikker*) be used therewith.

There appears to be no lower limit of sensitiveness to the audion, no minimum of suddenly applied E.M.F. below which the received impulses fail to produce any response. The exciting impulse, it is true, may be too minute to cause a directly discernible effect in the B circuit, but if this effect be amplified through one or more steps, as will be hereafter described, the effect of the original excitation is found to exist.

the receiving feats which are scored to its credit. (I will cite here only one of many authenticated instances of

Even in this day of universally accepted long-distance "wireless records," it is difficult for those who have not actually used the audion detector to believe some of recent long-distance work with the audion. On the night of January 13 last the steam yacht "Van Addie," when six hours off Curaçoa, Brazil, sent a message by Key West, using a small quenched-spark transmitter. This message was picked up by an antenna 40 feet above the roof of an apartment house in New York City, and correctly received, using an audion of the single plate and gride type).

The audion has the further advantage of entire absence of adjustment in the receiver itself. If the two battery potentials are once properly adjusted it requires no further attention. There is no fatigue under any condition of use. A powerful spark discharge in close proximity may cause the "blue arc," or visible cathode discharge to pass, but after a second or two this "paralysis" will automatically disappear; while a high resistance path (of the order of several megohms) between plate and grid will generally prevent this blue arcing.

This is, therefore, a suitable detector to use with a telegrapher's "breaking key." If a key-actuated relay be arranged to open the filament circuit with each depression of the Morse key, the audion is always ready to catch the distant operator's call, or attempt to "break" in the midst of a message. On the other hand, the sensitiveness of the electrolytic and best crystal detectors is frequently destroyed by one violent impulse, unless protected by shunting and disconnecting switches.

If there is any justification in the attempt to classify radio detectors as "current-operated" or "potential-operated" devices, there can not be the slightest hesitancy in classing the audion as a potential-operated detector. Obviously, it is in no sense a contact device, perfect or imperfect. Its response is strictly quantitative, up to the critical point in its voltage-responsive curve where "saturation" of ions or gas carriers begins. Up to that critical point the change in current passing from plate to filament is proportional to the voltage applied to the grid electrode.

This voltage may be merely that of the hand discharging into the grid. When the lead to this grid is suddenly grasped a click may be heard in the telephone receiver in the B circuit. If the charge thus impressed upon the grid be negative, a repulsion or scattering of the negatively charged carriers emanating from the filament occurs. If the impressed charge be positive, then these carriers may be attracted to the grid and discharged there, or delayed in the neighborhood. In either case, therefore, a diminution in the number of ions reaching the plate results, and we observe a diminution in the deflection of a sensitive milliammeter or galvanometer in the B circuit when a prolonged series of impulses is delivered to the grid. The normal current is usually of the order of a milliampere, and its response diminution may vary from an undiscernible amount to 50 or even 90 per cent of its full value.

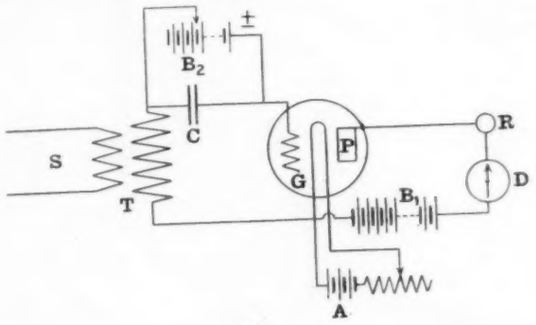


Fig. 2.

An insight into what forces are at work in the audion is afforded by experiments with a special circuit, such as that shown in Fig. 2. When a negative charge is applied to the grid a pop is heard in the telephone. When a positive charge is applied almost no sound is heard. If *C* is negatively charged to 20 volts while a sound from telephonic currents from source *S* is being received, the sensitiveness of the audion is practically annulled. When *G* is positively charged the sound is greatly reduced, but not to the foregoing extent. This experiment seems to show that in the normal operation

of the audion the imposition of a charge, negative or positive, upon the grid acts either to repel from its neighborhood the ionic carriers or to hold them idle there, thus in either case increasing the effective resistance in the filament-plate path.

The first establishment of the ionic circuit of an audion when the filament is suddenly lighted is perfectly silent; no sound is heard in the telephone, although a galvanometer in series shows that the "wake" is practically instantaneous. The establishment of the gaseous conductivity is sufficiently gradual, however, to make no sound. I do not know of any similar rapid circuit-closing device which is thus silent. While this B current assumes its nearly maximum amplitude, practically instantly its full value may not be reached for several seconds. A slow and irregular creeping of the milliammeter needle reveals how gradually the ions adjust themselves to a completely stable condition. Upon the rupture of the filament circuit, however, the B circuit lets go instantly, invariably accompanied by a click in the receiver telephone.

Referring again to the arrangement in Fig. 2. When the grid is positively charged and the voltage of B_2 is made nearly equal to that of B_1, and the heating current carefully adjusted, a very intense whistling note may be obtained in the telephone receiver, loud enough to be heard several feet from the instrument.

The pitch of this note slowly rises to a maximum, at which it remains for some time. A higher voltage at B_2 (18 volts) gives a higher initial pitch, which also increases to a maximum; a very pure sound. This note will sometimes increase from a very low to an extremely shrill pitch, then drop again down the scale and suddenly cease.

Such siren effects with this circuit are always transient and critical, usually obtained only when the blue glow is visible to the eye. The effect is not dependent on the presence of the condenser C, but a high impedance in the B_1 circuit is essential. An impedance in the B_2 circuit aids the phenomenon. When the grid is negatively charged the audion cannot be made to whistle. Its sensitivenes is nil, and if this B_2 voltage is made large enough the current through the B_1 circuit is completely cut off.

These siren phenomena are probably due to the alternating action of the suddenly altering positive charge on the grid upon the positive charge on the plate, and vice versa—*i. e.*, to the reaction of the two circuits upon each other through the coupling medium, the gas path in the bulb. The gradual increase of pitch observed may be due to the gradual increase in the intensity of the cathode discharge, which increase would take place, without the presence of the positive charge on the grid, very suddenly, but is now greatly retarded by the disturbing reciprocating action of the two charging circuits. When a stable state, or pitch, is reached the ensuing decrease of pitch may be due to the rapid running down in voltage of the small dry cells used, until the voltage across the gas is again reduced below the critical "blue arc" stage, whereupon the phenomenon ceases. These siren effects are not found with every bulb.

Even when the grid is uncharged an audion can be made to give out a loud piercing whistle if a magnet be held in the proper position near by. The pitch of this note may now be found to decrease as the B voltage is raised, as though a larger and heavier mass of cathode carriers were involved in the vibration or interruption. Considerable impedance, but no condenser, is necessary to obtain these effects, showing that we are not dealing here with ordinary oscillating circuit phenomena, where the frequency is proportional to the inverse product of induction and capacity.

My experiments with tungsten and other filaments, with platinum coated with alkali metals or salts, and with various gases or vapors in the bulb, have not succeeded in increasing the sensitiveness obtained with tantalum as filament and with atmospheric air exhausted to the optimum pressure. The optimum value of B potential to produce maximum sensitiveness depends on the degree of vacuum, being roughly proportional to the degree of exhaustion.

An interesting phenomenon is observed in certain bulbs where the B voltage is adjusted until a sheaf of visible blue cathode rays spreads out, fan-like, from around the edge of the plate. Then, when powerful impulses are received on the grid, a momentary flaring-out of this blue auro can be observed with each signal, so that it is possible to read the telegraph signals directly by sight. This effect has been observed at wireless receiving stations separated many miles from the transmitter.

For radio-telephony, whether in true wireless service or in the so-called "wired wireless," the audion is practically the only suitable receiver. Its extraordinary sensitiveness, its reliability and perfectly *quantitative* response have earned for it a general recognition, abroad as well as here. The range of communication is easily increased by 50 to 100 per cent over that possible with crystal or electrolytic detectors.

THE AUDION AS AN AMPLIFIER.

In a patent issued to the author in 1907 it described an arrangement whereby a grid audion can be so connected that it acts to relay and amplify minute pulsating electric impulses. Of late this amplifier has been much studied and is now being applied to a variety of purposes.

Fig. 3 shows the simplest arrangement, using two amplifiers "in cascade." The source of energy to be amplified may be an audion used as a radio-detector, a microphone, a magneto telephone receiver over a long-distance line, a cable transmitter or the like. T_1 represents a step-up transformer, essential if the impulses from S be of low voltage. For a single amplifier T_2 will represent the indicating instrument. For a two-step amplification T_2 is a one-to-two ratio transformer, the secondary of which can be left entirely open at one end, its other end being connected to the grid of amplifier No. 2. Where the two amplifiers are supplied from separate lighting batteries T_2 may consist of one coil only. Similarly, amplifier No. 2 may actuate a third, and so on; the successive steps requiring, as a rule, larger bulbs, with larger heating areas and cold electrode surfaces.

By measures made with the shunted telephone receiver method, a good audion amplifier shows an amplification of 500 per cent. This general ratio holds also for second and third steps, so that with three audion amplifiers in cascade I have obtained an energy amplification of some 120 times, and this including losses from the three transformers in circuit.

The strictly quantitative action above described holds for the hundredfold three-step amplifications as well, so that the ear, at least, detects no distortion in this process. This holds unless the third amplifier is over-excited so that the "blue arc" passes. This latter effect can always be prevented, as above explained, even while

relatively large current variations are registered. To what limits of amplification this audion principle can be carried has not yet been determined.

The principle involved differs so radically from any form of telephone-microphone or mechanical amplifying device that the audion opens up entirely new possibilities in all lines of micro-electrics. First of all, its extraordinary sensitiveness is attended with no delicate adjustments and is absolutely non-microphonic. No amount of jarring or mechanical vibration disturbs its complete reliability. The ticking of a watch placed upon an ordinary microphone connected with one dry cell in a primary circuit can be amplified and heard through a telephone when a coupling of less than 5 per cent unites the microphone circuit with the amplifier telephone circuit; whereas from the most sensitive telephone receiver connected directly in this secondary circuit not a shadow of a sound can be heard. Thus any microphone, or even an ordinary magneto-receiver, with a two or threefold amplifier, becomes a "dictograph," but with a delightful clearness of articulation.

If in the wireless telephone receiver we add one or two amplifiers to the usual audion detector, it is possible to bring up, clear and loud, articulation which with this detector and telephone receiver alone is too faint to understand. Similarly with the wireless telegraph. The amplifier when used to relay the signals received on the Poulsen ticker at San Francisco have postponed by two hours the period of "daylight fading" from Honolulu.

The current changes in the circuits of the second or third amplifier are sufficient to reliably operate a moderately sensitive contact relay, so that it is now possible to operate any desired form of calling device or remote-control apparatus by any wireless signals which are clearly audible, as well as the read signals which are quite inaudible with the ordinary detectors.

Inasmuch, now, as a theoretically perfect single rectifier can have an efficiency of only 50 per cent, the fact that the audion, amplifying alternating currents of practically any frequency, shows an efficiency of from 100 to 500 per cent should most effectively silence the old and recurrent contention that this detector is merely a sensitive and efficient rectifier, or "vacuum valve."

In a long-distance telephone field lies the most obvious and useful application of this amplifier. The audion used as a two-way amplifier at the middle of a metallic circuit requires, it is true, some type of the usual balanced circuits, with precautions to prevent "singing"; but the difficulties here afforded are less serious than with the microphone telephone repeater. The relative constancy of adjustment, and especially the freedom from microphonic troubles and distortion simplify the problem. It is the writer's hope that more detailed information of exceedingly interesting work which is being done in this direction by telephone engineers may shortly be presented.

Aside from long-distance work, other applications of this telephone relay, of more radical and far-reaching significance, may await the future. For example, it has been suggested that a magneto-telephone receiver be used in place of the microphone at each subscriber's station, allowing once more that original clearness and fidelity of voice which was sacrificed when the microphone was made a part of every telephone equipment. No central-battery energy need be supplied to the subscriber, except for calling purposes. His voice supplies the energy for driving this magneto-dynamo. The minute but correct currents thus generated might be carried to a central station over a pair of wires of such size that twice the present number of conductors could be enclosed in the standard-sized cables. With these minute currents troubles from cross-talk would be minimized, while high-resistance or microphonic contacts in the lines would cease to be the serious matters they are at present. The audion, being an extremely high-resistance device, requires for a transformer a high-wound primary, with a secondary adapted to standard telephone receivers. At the central stations, then, we would have banks of audion amplifiers fed from the common storage battery. Incoming and outgoing calls would operate signal devices with this central battery energy as at present, but when the talking circuit was made the subscriber's magneto transmitter would be connected through an induction coil to the grid of an idle audion, amplified, sent out over a trunk, re-amplified if necessary at the other exchange, transformed, and sent out to the receiver's station.

Inter-State Bondholders Seek Redress

Seventy-eight bondholders of the Inter-State Independent Telephone & Telegraph Company are plaintiffs in a bill filed December 11 in the circuit court in Cook county, charging that H. H. Evans, president of the company until September, 1910, conspired with B. E. Sunny, president of the Chicago Telephone Company, to wreck the Inter-State Company and drive it out of the competing field in Illinois.

Mr. Sunny, Mr. Evans, the American Telephone and Telegraph Company, the Chicago Telephone Company, and the Central Union Telephone Company are named the defendants in the suit. The bill charges that the Bell companies are now maintaining an illegal telephone monopoly in violation of the Illinois state constitution.

The Inter-State company operates in Aurora, Joliet, Elgin, Peoria, Springfield, Sterling, Morrison and other smaller towns. It had at that time 18,000 telephones in operation, with 1,500 miles of poles and lines. The plaintiffs were the owners of 778 bonds of the company, having a par value of $778,000, and they also held stock in the company as a bonus when they purchased bonds. Mr. Evans, a resident of Aurora, was president of the company from the date of its organization until September, 1910.

A fund still remains in the hands of the bank, and the plaintiffs say that they are entitled to receive par value for their bonds, and ask that the defendants be forced to pay them the difference between the amount they received and the par value.

Nebraska Commission Recognizes Labor Laws

The Nebraska Railway Commission, December 12, granted the Lincoln Telephone & Telegraph Company permission to close its Tecumseh exchange between the hours of 1 a. m. and 3 a. m. The object of this order is to permit the telephone company to obey the state labor law, which forbids working girls more than eight hours continuously between the hours of 10 p. m. and 6 a. m. State Labor Commissioner Pool has already started proceedings against the company because of the hours the night operators at Tecumseh were employed. It is probable that the telephone company will fix up sleeping quarters at the exchange for its night operators. The order of the commission is made subject to protests from the subscribers of the Tecumseh exchange.

Future Telephone Possibilities

Some Considerations of Economy and Efficiency Giving Opportunity for Further Study

BY H. D. STROUD

VIEWED from the standpoint of the electric service producer who manufactures that electric fluid which turns the wheels of manufacturers and transportation at a certain price per kilowatt hour, we must acknowledge a low degree of efficiency on the plant investment of a telephone property, especially that portion known as the subscriber's circuits radiating from one or more exchanges to the premises of the telephone subscribers.

These lines lie absolutely idle during more than ninety-eight per cent of the time, if we assume a general average of all subscribers' lines.

I cite this angle to the proposition as the economists', rather than the telephonists', point of view. The same might be said of the railroad over which intermittent service is given instead of a continuous volume of traffic covering the rails throughout the day.

There does not occur to me any other kind of service that is analagous to that of telephonic communication, except that from the economist's viewpoint, the fire and burglar protection service is similar in that it is called into actual use periodically with far greater intervening spaces of idleness.

It is not the least surprising, therefore, in the age where efficiency is the universal watchword, that we find men at work to the end of finding other work for telephone lines in an effort to make them do a respectable day's work for the attention bestowed upon them in keeping them free from grounds, crosses and the other contaminating influences that telephone lines are heir to.

Many telephone men will recall the late Oscar Wentworth Rogers, who cherished a great dream of harnessing every inch of telephone line in the United States, Canada and the rest of the earth, and by means of his wonderful generator producing a current of a mysterious character, to light and heat every farm house, run motors to operate everything on the farm, and do everything ever dreamed of by the most imaginative mind, either in or out of the incurable wards.

Roger's proposition was intensely interesting and the money he had to spend and did spend, on page upon page of space in telephone journals, his ability to retain dozens of usually responsible telephone engineers, together with persistent rumors that the president of one of America's largest insurance companies was going the limit with Oscar, gradually strengthened confidence in the minds of hundreds of telephone men who had many miles of telephone lines awaiting this genius of efficiency, that there must be something in it. Though Roger's great secret dies with its owner, his meteoric passage through the telephone firmament served some purpose, for it brought to the minds of telephone men the idea of making greater use of their wires, and played some part, no doubt in stimulating inventive talent to devise apparatus that might in other ways make telephone lines render greater service to the communities which they cover, and a better return on the capital invested in their construction and care.

The telephone man, particularly the telephone plant engineer, will usually be found to hold an ultra conservative attitude toward telephone accessories, not directly in line with the development of the art of telephony in the strict sense, and when he becomes active in the matter of making additional blades grow on the same stalk, it is under the pressure of the economist's wishes, the latter appearing usually in the guise of the financial member of the enterprise. The former because of his particular line of training and thinking takes the attitude that his own business is such as to consume his time and attention and is a pretty big job at that.

Why, he asks, would you add complications to an already intricate system and increase the risk of disorders where a condition of readiness to serve must be maintained to the last possible degree of efficiency? Is not the task of rendering good telephone service one that should have our undivided attention?

These are proper questions to ask, but ones that only experience can answer

Did you ever consider what relation the telephone system bears to the nation, state and the local community? Is it not the nervous system of the whole social structure, which, if diseased or removed, would render the great body which it serves as helpless as the human body with its nerve trunk and subscribers' lines disabled? Of course, there is but little chance of such a calamity because of the fact that the United States has a double nervous system, both working side by side, each trying to do its work better than the other, and both combined unable to keep pace with the exacting demands of a marvelously fast-growing nation. This calls to my attention a thought most fitting here. I recently heard a lecture on Poland in connection with the work of missionary work, and after the lecture I talked with the lecturer and asked him if it would not be better if we gave our attention to some other people and let Europe take care of Poland. No, he said, because Poland is coming here by the shipload, and in twenty years she will have delivered to us more people to assimilate into our national structure than she now has at home. Likewise every public service, including the telephone, will have to serve the millions now in foreign lands who will be here in the next twenty years.

Referring back to the analogy of the telephone and the human nervous systems, assume that there are other kinds of service that the future will develop calling for the use of wires from homes and places of business, what agency other than the telephone system with its nerve terminals radiating within every reach of every home, shop or factory can supply the demands?

There are signs of these future services, such as burglar and fire protection, music, news, advertising, etc., that the public wants and will pay for, but must first be educated to, before they will become fixed institutions, such as that of oral communication as represented by the telephone in its present state of development.

Who is going to foster these new kinds of service and develop them, if not those whose expensive wire nerve system now cover the field so nearly as practically to bar any other agencies from the undertaking, or at least make them the economically logical agency for this accomplishment?

It becomes more of a duty when, as has been to some degree demonstrated, these kinds of service may

be rendered at a comparative small additional expense, using the same wires as are used to talk over, and without in any way interfering with their primary purpose.

There is now on the market apparatus for fire and burglar protection applicable to automatic and manual telephone systems that is very reliable, that requires no special wires between the exchanges and the places to be protected.

There is apparatus also to be had adapted to render several forms of special service such as music, lectures, news and advertising. This apparatus is in the nature of a loud speaking telephone with a horn attachment that may be connected to a central service source at the will of the subscriber by the simple act of turning a switch on or near his telephone.

No extra wires are required for this service between the telephone exchange and the premises of the subscriber, and the special apparatus required at the subscriber's place is such that with the proper plan of rentals, and an efficient character of service given, people who have telephones may enjoy good music, hear instructive lectures, speeches and readings at their own firesides and at an added cost so small that every subscriber to residence telephone service would have it.

Who can predict but that through this means we may hear the morning news at our breakfast tables? Our great and powerful news agencies collect, why is it not possible that they may distribute, news by wire, and possibly give us some advertising announcements in the same way, if handled so cleverly as not to offend the listener, and still serve their purpose?

Recently a plan was proposed to charge automobile batteries over the owner's telephone lines, and while one may well be extremely skeptical of any proposition bordering on the Rogers' dream of power transmission over telephone circuits, yet greater dreams have come true.

We do know it to be a fact that it was, and probably is yet, a quite general practice in some telephone systems to charge private branch exchange storage batteries over trunk lines that are used to talk over, the batteries having all night and holidays to charge up, also the time between calls at a rate of charge that will pass the heat coils without damage.

The economist sometimes rushes in where the engineer fears to tread and puts one over. This is because the latter is occupied with the concrete problems that absorb his attention and sometimes contract his vision, while the former, left free to deal with the things in the abstract sense, often gets to the goal at a single jump by a new path; as in the case of Professor Pupin of Columbia University, who hit upon the principle of utilizing inductive reaction to neutralize the absorbing effects of electrostatic capacity on telephone lines, thus taking off the limits of distance for voice transmission and making possible speech across the continent, and possibly even beneath the oceans..

It was once considered absurd to think of taking duplex over one pair of telephone wires, yet it has recently been done by an army officer.

Our phantom circuits give us three talking paths when we had but two before, or one and one-half per pair of wires, and the peculiar feature is that the one created out of thin air (therefore called the phantom) gives the clearest transmission of the three.

He who questions the future possibilities of telephony assumes the risk of ridicule.

Service Committee for Independent Associati on

At the directors' meeting of the Independent Telephone Association of America held at Chicago on December 17, it was voted that a permanent Service Committee be appointed, consisting of not less than nine members, who will devote their attention to matters of the Service Department. The members of this committee will consist of operating company representatives only, and some of the most competent commercial, plant, traffic and accounting men in the telephone field will serve, which makes the Service Department of great value to every member of the organization—in fact, to every independent operating company. Additional members from various parts of the country will be appointed from time to time in order that the Association may be familiar with conditions that exist in all independent offices, and that the various methods and ways of doing business in all sections of the country will be understood by this committee. The idea is that there is no doubt considerable valuable information possessed by companies in certain sections of the country that is unknown to companies in other sections, and therefore it is the idea of the Association to secure such information and distribute it. The committee will decide as to what bulletins will be compiled and distributed by the Service Department; also what course willl be followed in carrying on the work. Careful attention will be given the subjects, which will be covered by bulletins, and such questions as proper maintenance, inspection of pole line, proper testing of apparatus and circuits, methods of securing new business, and many other important questions no doubt will be covered through the bulletin. The operating companies are greatly interested in the success of the Service Department, and many inquiries have recently been received and the information promptly furnished which has been beneficiary to the companies seeking advice on various subjects.

All independent telephone companies are urged to write the department concerning any matters where assistance is desired concerning the proper operation of their plants, as every effort is being put forth by the department in the interests of independent telephony. Therefore, it is hoped that all companies will co-operate with us at all times, and not hesitate in either furnishing or asking for information.

Immediately following the association's annual convention, which is to be held on January 6, 7 and 8 at Hotel La Salle, Chicago, the Service Department will start an active campaign and every operating company is urged to become affiliated with the Association and take an interest in this important work.

Telephones to Prevent Escape of Convicts

Warden Thomas is installing a telephone system at the penitentiary at Columbus, Ohio, which, when completed, will be one of the most complete reporting stations of its kind in the country. The central station is located in the guardroom and will be operated in the day time by a prisoner and at night by guards.

If a guard on the wall or in a turret should see a prisoner escaping he can immediately call the guardroom for help, and the chase will be started in much less time than is the case at present. Should a guard forget to pull his box at the stated time, he will be called by telephone. If he does not answer, a corps of guards will be sent to ascertain if there is trouble.

Operator's Speech as a Part of Good Service

Address Before the New York Telephone Society

BY J. L. TURNER

THE means which the operator must use to obtain the proper voice expression are, tone quality, inflection and emphasis. It is difficult to describe the function of each of these separately, as they are usually employed together and have a combined effect. However, it is chiefly through the tone quality of the voice that the operator expresses her general attitude towards her work of serving the subscriber, while the use of inflection and emphasis gives to her replies and reports certain meanings which make for a more intelligent and sympathetic relationship between herself and the subscriber.

A FEW PHRASES AND HOW TO SAY THEM.

Probably the best plan to follow in explaining the application of the formula given above is to take up a few actual phrases prescribed for the use of the operators. The words used more often than any others by the operator are those which serve as her introduction to the calling subscriber and which give him his first impression of her. This first impression is usually a lasting one and it also has the *immediate* effect of putting the subscriber in an agreeable and co-operative frame of mind or, on the other hand, of making him impatient (perhaps unconsciously so) and lacking in confidence in the operator. On every call the operator answers with the words, "Number, please?" Repeated as it is a thousand and more times a day, it is very natural that it should be spoken in a hurried, careless and unintelligible manner, whereas, in view of its far-reaching effect, the operator should be most particular as to how she says it. It is human nature that the subscriber should be pleased to receive cheerful, willing, wide-awake and intelligent service, and much of that very impression can be given him by saying, "Number, please?" in a bright, pleasant and *smiling* tone. There should also be a decided rising inflection for denoting the question, and the proper value should be given to both syllables. The operator might just as well reply with a grunt as to mumble "Number." The latter expression might let the subscriber know that the operator has answered, but as for any impression he might form of her and of the sort of attention he is going to get from her, it would be unfavorable to say the least. And so tone quality, inflection and pronunciation must all be perfected, even in this short and simple answer in order to produce the proper effect, and blessed is that operator who naturally, or through conscientious practice and study, is able to answer in such a manner that her subscriber immediately responds with a feeling of pleasure, whether expressed in so many words or not, "Aha! There's my obliging operator. *She'll* give me what I want."

WHY THE OPERATOR REPEATS THE NUMBER.

Following this comes the repetition of the subscriber's call. What for? That is just what so few operators seem to understand. If the repetition were of such little importance as these operators seem to think, it could be eliminated entirely or the word "Right" could be substituted for it. But that would never be countenanced by any operating rules committee. Then let's have the calls repeated properly. The full meaning to be conveyed to the calling subscriber is expressed by the words, "Did you say Main 5-9-8-0?" Obviously that long phrase can not be used, but the meaning can and should be just as clearly expressed in the simple repetition of the call itself, with the rising (questioning) inflection on the end. If said in this manner, the repetition would require a reply or acknowledgment from the subscriber, such as "Yes" or "No," just as would the sentence quoted above, and the more the subscriber can be educated by the operator to acknowledge or correct her repetitions, the better for the service. Very frequently, although she may repeat the call correctly, the operator is uncertain of it, due possibly to the indistinct manner in which the subscriber gave it, and the reply "Yes" would relieve her mind of that uncertainty. As in all other lines of work, *confidence* is a very material asset in the work of the operator. In repeating the numbers the operator must also emphasize each digit separately, thereby making it possible to enunciate each one the more clearly in accordance with certain special rules for enunciation prescribed for the operator's guidance.

"BUSY" REPORTS.

One of the reports that the operator should be particularly careful in giving to the subscriber is the one which he is probably the most annoyed at receiving. That is the "busy" report. And yet that report can be spoken in such a way that only the most unreasonable person will take offense, as far as the operator is concerned, at her giving it. The meaning to be conveyed is not merely that the line of the called subscriber is already in use, but that the operator is *sorry* to have to report that such is the case. There is all the difference in the world between the two as far as the feelings of the calling subscriber are concerned. "The line is *busy*" (which is the busy report), should be said with the same emphasis on the first syllable of the word "busy," and with the same tone of sympathetic concern, as one would employ in saying, "I am *sorry*, Mr. Smith, but I can not give you what you want." The peculiar combination of emphasis and inflection which should be employed in saying the word *"busy"* is difficult to explain except through oral illustration. We have hit upon the term "sorry inflection" in speaking of it to the operators. Practically the same ideas apply in the case of the "don't answer" report and the operator should be careful to say, "They don't *an*swer" with the same sorry inflection on the word "answer" and with the same tone of concern as employed in giving the busy report.

When these two reports are

given in the manner described the subscriber is somehow impressed with the *sincerity* of the operator and where sincerity is evident in the work of another, human nature is generous enough not to be offended even when put to inconvenience.

REFERRING A SUBSCRIBER TO A SUPERIOR.

Another phrase which must be spoken in just the right way is that which the operator uses in referring subscribers to a superior, chief operator or district traffic chief under various and miscellaneous conditions when they should talk with someone in the office who is better able to attend to the matter than herself. Sometimes a bitter complaint is made by a super-sensitive subscriber that the operator has been so impertinent as to order him to tell his troubles to the chief operator and not bother her (the operator) about them. This is simply because the operator has spoken somewhat hurriedly perhaps, so that she *told* the subscriber to speak to the chief operator rather than *requested* him to do so.

ERRORS IN CALLING.

A phrase prescribed for use under conditions which are most aggravating to the subscriber is that addressed to one who has been called in error. "Excuse me, I rang you by mistake." Here the whole phrase is intended as an *apology*. That is the meaning that should be conveyed. Otherwise the displeased subscriber would very easily get the impression that the operator was lightly *ordering* him to excuse it.

"HELLO."

Even the one little word "Hello," which the operators have no occasion to use but which subscribers will persist in using in spite of the educational movement against its use, can be spoken so as to convey entirely opposite meanings. It can be said with the rising inflection as a question and with a courteous and pleasant tone of voice which will make a most agreeable impression. To that use of the word there would positively be no objection. On the other hand, it can be spoken with a falling inflection and in a disagreeable and annoyed tone of voice that would make a very unpleasant impression upon the person at the other telephone.

EFFECT OF VOICE EXPRESSION ON SUBSCRIBERS.

And so we could take up one by one all of the phrases employed by the operators, analyzing each one and determining the voice expression to be used. In every case the meaning to be conveyed, the impression to be made upon the subscriber, must be fully understood and kept in mind by the operator who would be commended by her subscribers. It is not difficult, but the art of expression and telephone courtesy must be taught to the operator, not because she is unladylike, and not with the idea of making her appear affected (of "spreading it on too thick" as some people might say), but, as pointed out towards the beginning of this article, because of the peculiarities of conversation carried on over the telephone and of the peculiar requirements of telephone courtesy.

Experience has shown that subscribers are highly appreciative of the service of operators who have been taught this art of expression. They are impressed with the sincerity, the intelligence, the cheerfulness and the unfailing courtesy of the operators. This training has placed the operators upon a higher plane and has established a more friendly and sympathetic relationship between them and their subscribers.

PLEASANT RELATIONS WITH SUBSCRIBERS LIGHTEN WORK OF OPERATORS.

As regards the effect upon the operators themselves, a great deal of good can be reported. Their work is much pleasanter because of their improved relations with the subscribers. They have fewer complaints to harrass them. Through constantly schooling themselves to be bright and cheerful in their manner they actually become so temperamentally. Their work is more interesting because it *means* more to them as well as to the subscribers and is of a higher grade. Their efficiency is increased because they can handle a heavy load and still leave the board much fresher and brighter mentally than operators who have simply plowed through their work in a monotonous, indifferent and too-busy-to-bother fashion, with all its resultant confusion and irritation. They look upon their work with greater respect because they realize that it has a distinctly refining value as far as they themselves are concerned.

So the art of expression has come to play a peculiarly important part in the work of the telephone operator, simply because it provides her with the only means of properly impressing that public whose interests she is serving so loyally and so earnestly.

Higher Wages, Higher Rates

Following action of directors of the Cleveland Telephone Company, December 10, in refusing to pay the usual quarterly dividend, E. A. Reed of Columbus, general manager of the Bell telephone interests for Ohio, stated that if the state requires a further increase in wages paid operators there must be a corresponding increase in the price to telephone users.

A general increase this year in salaries paid exchange operators there has been made and they compare favorably with wages paid operators in other cities of a corresponding size.

If a further increase is required by the state public utilities commission, it is said it will necessitate either a reduction in the number of calls allowed subscribers under present rates charged, or a higher charge for the same volume of calls allowed under present rates.

In the past twenty years, while the cost of other commodities has doubled, tripled and quadrupled, telephone rates have remained stationary in spite of the increased cost of materials and increased wages being paid in all departments.

Agree on Route Compromise In Missouri

Provisions for a compromise of the controversy between the combined telephone systems of Joplin and the Kinloch Long Distance Telephone Company of St. Louis relative to the routing of long distance telephone calls out of Joplin, was agreed upon at a conference of city officials and representatives of both the Home Telephone Company and the Missouri and Kansas (Bell) Telephone Company of Joplin, Mo. The provisions agreed upon have been submitted to representatives of the Kinloch company which, it is believed, will abide by the proposed agreement of other parties interested.

The compromise would recognize the contract existing between the Kinloch and the Home companies relative to the routing of long distance calls out of Joplin, but would permit the routing of calls over the Bell long distance wires where the Kinloch lines did not extend, or in any case where a patron requested that the call be routed over the Bell wires. Otherwise the Kinloch wires would be used as at present.

Kansas Independents Convene

The Kansas Independent Telephone Association convention opened Monday, December 8, at the Chamber of Commerce rooms at the Salina city hall. The visitors were welcomed by former Mayor Kirtland on behalf of the city, Mayor Niquette being out of the city at that time. Mr. Kirtland's address was in his usual happy vein. The response was given by J. D. Water of Bonner Springs, chairman of the executive committee. Following the response, the delegates and local men enjoyed a smoker and social evening.

Each member of the association came to the convention to learn something which might benefit him in his own local sphere and very few members missed the instructive lectures at the New Theater. The lectures were given by the most thoroughly posted men whom the Kansas association could secure.

T. L. Dunlap of the Monarch Telephone Supply Company, who has been in the telephone business practically all his life, opened the convention with an illustrated lecture on "The Telephone, Generator, Ringer, Transmitter, Receiver, Induction Coil, Switchhook, Condenser, Arrester and Battery." In his paper Mr. Dunlap showed sectional views of each part of a telephone, explaining how the different parts operated with respect to an adjoining part and then taking each separate instrument in the telephone and explaining it in detail. Mr. Dunlap's talk was highly interesting.

H. N. Faris of the Kellogg Switchboard Company followed Mr. Dunlap and took the convention on a trip through the Kellogg factories with lantern slides. Mr. Faris emphasized the fact that universal switchboards were becoming a necessity, as switchboards adapted to battery or magneto systems, alone, were becoming obsolete. He explained the situation by saying that the battery type of switchboards are better adapted for certain purposes than the magneto type, but if a magneto type is desired, the board should be of such design that a change could be made to the battery if necessary without great expense.

T. L. Dunlap of the Monarch Telephone Company gave an illustrated talk at the New Theater on "The Telephone—Why It Talks; Some Circuits." Mr. Dunlap arranged a set of slides to be used in connection with his talk and with the slides, the telephone men were shown the workings of each distinct part of the telephone now in use. Mr. Dunlap also explained how the sound was transmitted over a wire and the manner in which the sound wave was given at the transmitter end and also how the receiver of the telephone conveyed the sound wave to the ear.

Among the telephone men who registered at the convention are: A. A. Johnson, Salina; W. T. Frier, Russell; S. M. Ewing, Victor; James Babbitt, Yorktown; A. B. Clarke, Kansas City; E. W. Dow, Baxter Springs; G. B. Darling, Hardtner; E. E. Jones, Miltonvale; E. Armstrong, Greenleaf; Alex Ballerd, Miltonvale; Cyrus Gaston, Glen Elder; E. H. McLaughlin, Salina; W. A. McCall, Glen Elder; C. P. Swedenburg, Salina; Sam Farley, Salina; A. Lundblade, Jamestown; Ralph Van Trine, Salina; A. P. Burgman, Oak Hill; R. H. Shove, Winchester; A. H. Manning, McLouth; J. D. Frost, Perry; chester; A. H. Manning, McLough; J. D. Frost, Perry; J. L. Holt, Hartford; J. C. Kelsey, Chicago; J. B. Lockard, Salina; H. J. Kanmp, Blue Rapids; C. A. Critchlow, Blue Rapids; M. L. Robeson, Salina; R. A. Lindblom, Salina; Charles Williams, Silver Lake; F. A. Rader, Chicago; C. A. Hanson, Assaria; A. J. Frederickson, Lindsborg; H. J. Clark, Kansas City; Edward Anderson, Salina; A. C. Nelson, National Carbon Company; J. C. Janzen, Hillsboro; H. A. White, Kansas City; J. E. Carr, Salina; S. F. Tucker, Courtland; E. D. Echols, Topeka; J. Mahan, Kansas City; W. D. Curtiss, St. Joseph; H. W. Sexson, Leavenworth; T. L. Dunlap, Ft. Dodge; H. B. Hewitt, Manhattan; E. C. Hinderstock, Osage City; T. L. Youmans, Osawatomie; H. S. Morgan, Dexter; S. V. Swallow, Elk City; W. H. Brock, Allen; Asa Cooper, Burden; Frank Cooper, Longton; G. H. Sherwood, Grenola; J. H. Close, Topeka; W. J. Edwards, Bendena; George Crawford, Girard; Samuel Tucker, Pleasanton; J. D. Waters, Bonner Springs; J. A. McDonald, La Harpe; H. H. Efferson, Moran, L. A. Walker, Parsons; L. M. Campbell, Yates Center; D. O. States, Buffalo; G. S. Peterson, Altoona; H. D. Smith, Parsons; L. C. Criner, McPherson; A. J. Stevens, Hiawatha; J. J. Connell, Kansas City; J. E. Stewart, Wamego; George W. Jenkins, Wamego; Charles A. Sloan, Pratt; W. T. Weisscup, Haven; L. Wilson, Haven; J. E. Webb, Oxford; W. E. Dorsey, Wellington; C. E. Reece, Riley; A. G. Anderson, Salina; D. A. Van Trine, Salina; Clarence Wilson, Salina; J. O. Wilson, Salina; B. H. Veltman, Bavaria; E. R. Ruck, Claflin; H. L. Branman, Claflin; W. J. Meyer, Bison; M. H. Rice, Delphos; J. H. Berry, Delphos; Benjamin Bearnes, Wilson; M. Shepherd, Bennington; W. W. Dilworth, Beloit; W. W. Wiltrout, Logan; C. L. Brown, Abilene; Jack Weller, Abilene; H. N. Faris, Kansas City; L. B. MacKinnon, Topeka; A. R. Meeker, Cheney; J. R. Love, Sterling; A. L. Holm, Marquette; S. F. Rorlyers, Beloit; Joseph Harzman, WaKeeney; B. H. Painter, Beverly; E. B. Shaw, Gypsum; R. S. Goffe, Sulphur, Oklahoma; A. S. McLeod, Hoxie, and M. E. Mitchell, Moreland.

Suggests Government Establish Test Service

It has been suggested that the government take over several telegraph or telephone wires and experiment with them for the purpose of learning how much it will cost to operate them for the public, whether their operation will fit in easily as a part of the ordinary post office routine, and what effect it will have on the rates to the public.

For instance, the government might establish a telegraph and telephone service between New York and Chicago, including intermediate points. Persons desiring to send telegrams or telephone messages to any of these points might then give their business to the government instead of the commercial companies if they chose. If the government could do the work efficiently at a lower rate than the commercial companies charge, the system could then be extended gradually. If discovered that the contrary is the case, the whole scheme could be abandoned easily.

Minnesota Independents to Convene

The Minnesota Independent Association will hold its regular annual meeting at the Ryan Hotel, St. Paul, Minn., January 27. The executive board will open headquarters January 26, at which time those interested may have an opportunity to confer on matters of importance. Those attending the convention will be entertained by the Commercial Club of St. Paul on the evening of the 27th.

International Engineering Congress of 1915

Under the auspices of the American Society of Civil Engineers, the American Institute of Mining Engineers, the American Society of Mechanical Engineers, the American Institute of Electrical Engineers, and the Society of Naval Architects and Marine Engineers, there will be convened at the Panama-Pacific International Exposition, in 1915, an International Engineering Congress.

Engineers in all parts of the world have signified their intention of attending and the delegation from Great Britain promises to be large in point of numbers and great in distinction.

The presidents and secretaries of the five organizations above named, together with eighteen other members, constitute the official body which will assemble and conduct the congress. Colonel George W. Goethals, chief engineer of the Isthmian Canal committee, has consented to act as honorary president of the congress, and will be in attendance in San Francisco when the celebration is held commemorating the completion of the greatest engineering achievement in all history. The vice-presidents of the congress will be selected from the most distinguished engineers of all the nations, and with the president will form a body of men of the highest standing in the world of engineering.

The week of September 20-25, 1915, will be the time of the sessions of the international congress and the proceedings of the meetings will be preserved in permanent book form. These volumes will contain the papers contributed to the congress by eminent engineers and will embrace in their scope every line of engineering activity, giving the latest word of authority in the field of engineering.

The executive offices of the congress are in the Foxcroft building, San Francisco, Cal., U. S. A., where the following officers of the committee are located:

W. F. Durand, chairman; W. A. Cattell, secretary-treasurer; E. J. Dupuy, executive secretary. The following are the chairmen of the sub-committees: C. F. Rand, participation; W. F. Durand, executive; W. G. Dodd, finance; A. M. Hunt, papers; W. A. Cattell, publicity; E. H. Benjamin, local affairs.

Pipe Carries Wire Over Mountain

The construction of 900 feet of ¾-inch pipe containing an insulated telephone wire is the unique plan which has been carried into successful operation by Supervisor A. W. Jensen of the Manti national forest, to conquer the elements which rage at the top of Horseshoe mountain in the Wasatch range during the winter months. According to Mr. Jensen, who is now at the Fourth district headquarters in Ogden, Utah, the line over the mountain top was completed during the past season and has been in successful operation.

The famous Horseshoe mountain, 10,590 feet altitude, is one of the landmarks of the lower Wasatch range and from its rim a view is obtained that would repay a stiff climb; such a climb is not necessary, however, since the trip can be made from Ephraim by easy grades on horseback. The divide to the north of this mountain, however, has proved a decided obstacle to the maintenance of telephone communication through the winter. The wire becomes encrusted with coats of frost, ice and snow until its diameter is as great as three inches. Then a strong northwest wind bears down upon it, breaking wire, brackets, and if these fail to give way, even poles eight inches in diameter.

Supervisor Jensen of the Manti forest, who is himself a lawyer and was for two years in charge of the legal work of District 4, was not to be deprived of his say to the people of Orangeville, even in cold weather, and so during the past summer installed across the troublesome summit 900 feet of ¾-inch pipe containing an insulated wire. On account of the severity of thunderstorms in summer, the air line is repaired and the underground line disconnected for the months of July, August and September.

Cincinnati Long Distance Service Improved

Through the efforts of its chamber of commerce Cincinnati will enjoy improved long distance telephone service with New York and other eastern cities. For some time the Cincinnati organization has been in correspondence with the officials of the American Telephone and Telegraph Company in regard to a speedier calling system between that city and New York, with the result that during the first fifteen days in December the average time for getting an answer to a call in New York has been reduced to a fraction over eleven minutes. It is promised by the company that even this excellent average will be reduced within a few weeks, as arrangements have been made for a direct Cincinnati-New York wire.

The Chamber of Commerce also is advocating the securing of telephone directories of all the important cities having communication with Cincinnati for use in the local exchange, hotels and other institutions where long distance calls are frequent. By having these directories at hand much valuable time can be saved by giving the operator the number desired in the other city, instead of merely the name and address.

The plan has never been tried in any city, but is regarded as feasible and as adding to the efficiency of the long distance service.

Oregon Commission Compels Connection

Holding that there is a public necessity for the service the Oregon Railroad Commission issued an order in the complaint of the Wright-Dickinson Hotel Company, owners of the Hotel Oregon in Portland, against the Pacific Telephone & Telegraph Company, that the telephone company interchange calls with the Home Telephone & Telegraph Company in the hotel.

It is the first time in the history of the two companies in the state that the older one has been ordered to give an interchange service with its rival and it fought to the last against doing so. The precedent is regarded as highly important as forecasting a general interchange of switches between competing telephone companies in Oregon.

The victory of the hotel is not complete, however, for it will have to pay the Pacific company 3 1-3 cents each on all outgoing calls transferred from Home lines to Pacific lines in the building. There will be no charge for calls coming into the hotel.

Missouri Independents Announce New Date

On account of the National Independent Telephone Association holding its convention in Chicago on January 14, the Sixth District Missouri Independent Telephone Association will meet Thursday, January 8, instead of January 14, as announced.

Western Electric's Place in the Bell System

An Analysis of the Relationship Between Bell Operating Companies and Their Factory

BY GERARD SWOPE

THE growth of the close and cordial relations between the associate Bell telephone companies and the Western Electric Company, although spread over several decades, has, within the last few years, become so pronounced as to be recognizable to almost every employee of both companies. This has been due largely to the contract relationship under which the Western Electric Company is now acting as the purchasing agent and supply department of every Bell telephone company and many other telephone companies in the United States and the Western Union Telegraph Company.

The contract made between the American Bell Telephone Company and the Western Electric Company in 1881 provided that the Western Electric Company should make all of the telephones of the American Bell Telephone Company and otherwise should not make telephones for use in the United States, and that it should make and sell other telephonic apparatus for the licensed companies and otherwise should not sell telephonic apparatus in the United States. It did *not* provide that the licensed companies should buy exclusively of the Western Electric Company. Upwards of six years ago the original contract between the American Bell Telephone Company and the Western Electric Company was still further modified, enabling the Western Electric Company to sell telephonic apparatus to other than licensed companies.

In connection with the sale of its other manufactures, the Western Electric Company gradually built up a large business in the field of line material and other supplies not of its own manufacture. As it developed that the Western Electric Company could purchase these supplies and sell them to the operating companies at better prices than, as individual companies, they could buy their own supplies in the open market, this company soon became the largest buyer of such supplies, and a natural foundation was laid for the existing supply contract relationship which followed.

The standard form of contract concentrates in the Western Electric Company the responsibility for all of the purchasing. It enables it to secure for those companies under contract the advantages of quantity in buying, and the ability to maintain a corps of specialists in buying, warehousing and distributing. For the operating companies it has made considerable savings in the first costs of supplies and for the Bell system as a whole it has done much in standardizing plant and decreasing investment, and made large savings in freight charges through better plans of distribution.

The American Telephone & Telegraph Company furnishes the Western Electric Company with specifications as to the types and quantity of material required in the service of the associated companies. It furnishes to it in December of each year a general statement of the quantity of material required by the companies during the following year. This enables it not only to plan in advance the volume of its manufactures during the year, but as well its contracts covering purchases of supplies, and in general, to make comprehensive plans for the distribution of such material through its general sales department, the factories of its suppliers, and its own chain of distributing houses throughout the country.

WESTERN ELECTRIC COMPANY AS MANUFACTURING BRANCH OF BELL SYSTEM.

The work of the Western Electric Company in connection with the Bell system naturally divides itself into two main divisions:

1. As part of the engineering department, and the manufacturing branch of the Bell system.
2. As the purchasing and supply department of the Bell system.

The first function, under which it designs and manufactures apparatus, is one that it performed before the introduction of the purchasing and supply contracts, and which it can still be considered to perform, independent of these contract relations. Its relations with the operating telephone companies as a manufacturer are the same as any other manufacturer who supplies apparatus or merchandise in accordance with the specifications laid down by the engineering department of the American Telephone & Telegraph Company.

Careful studies of its prices on telephone apparatus as compared with those of its competitors in the United States and abroad are continually being made. In no case does it sell the same apparatus to any one in any quantity at prices lower than it does to any of the associate companies. That its prices are reasonable is proven by the fact that in the United States during the past five years it has secured an ever-increasing business. Further evidence of the reasonableness of the prices on its own manufactures is to be had in Europe, where, in the face of not only keen competition, but also a strong chauvinistic spirit, it has obtained a fair proportion of the business.

The Western Electric Company is constantly making studies of costs on the various lines it manufactures, as a result of which new designs and improved methods of manufacture are introduced. In the past five years of advancing prices of labor and material, prices for telephone apparatus to the Bell companies have not increased. On the other hand, as costs have been reduced prices have been lowered. Such price reductions in the above mentioned period have amounted to approximately a million and a half dollars.

On account of the close relations existing between the Western Electric Company and the Bell system, the obligation rests the more heavily upon it to show to any inquiring public service commission, that the prices which the telephone companies are paying are as low as those which might be secured from others. Where such investigations have been conducted, the commissions have expressed their approval and satisfaction with the contract relation, and have concluded that the prices were reasonable. There have been a number of such conclusions in different parts of the United States.

AS PURCHASING AGENT AND SUPPLY DEPARTMENT TO THE BELL SYSTEM.

The buying and storing of merchandise for the Bell system is such a large problem that it demands and has received careful study by specialists. Its efficient operation may mean thousands of dollars additional revenue to

the telephone companies, as well as making available millions of dollars for investment in plant rather than in idle merchandise. The following functions are within the scope of the standard supply contract:

Buying Receiving Storing Shipping	New Material	Receiving Repairing Storing Reissuing	Used Material

From this it will be seen that in entering into this contract the Western Electric Company took over certain functions of one or more departments of the associate companies, and the relation of this company in carrying out the contract should be, as far as possible, that of a department of the telephone company. The distributing houses, which are entrusted with the execution of this relation, should do everything required of such departments, only more comprehensively than could be done by the telephone companies. This relationship is fundamental and must be the basis of the decision of many questions which arise from time to time in carrying out the contracts.

By foreseeing the telephone companies' requirements, merchandise not manufactured by the Western Electric Company is purchased in large quantities, under the most favorable contracts. Orders are given to suppliers so that they may manufacture in normally slack periods and thus reduce the ultimate cost of goods to the Bell system.

The location of the distributing houses is an important question, and a study was made without reference to the lines separating the various telephone companies, but using as a basis the sources of supply, the points of use of the merchandise, the service that must be given, the facilities for distribution, and the freight rates.

A warehouse is opened in a particular city when that city is of such size and the telephone development of such magnitude that a large amount of merchandise will be needed there or in the immediately adjoining territory.

The guiding principle in distributing merchandise is to carry stocks where they are made and make shipments to the places of ultimate consumption with the minimum of rehandling.

Not only at Hawthorne, where the large general merchandise warehouse is located, but also at the many warehouses throughout the United States, studies are being made on better methods of storing, handling and shipping merchandise, with the idea of improving the service and reducing the cost of such service.

The remuneration to the Western Electric Company for performing these various functions of buying, receiving, storing and shipping merchandise is defined in the contract. In the early contracts the Western Electric Company undertook to do this work at cost, but not to exceed the cost previously borne by the telephone company for such service. As the problem was better understood, lower rates of remuneration were set, until today the standard form of contract provides for rates of remuneration varying from 1 per cent on direct shipments of certain classes of material, to 6 per cent, the maximum, for buying, receiving, storing, shipping merchandise and carrying the investment. Careful supervision and close attention to the work must be given by the Western Electric Company if there is to be any resulting net profit with these low rates of remuneration.

In addition to the above, the Western Electric Company holds itself in readiness to perform any other functions for the telephone company for which, on account of its organization, it seems well adapted; the conversion and disposition of material taken out of plant is a case in point, this work being done at cost.

EMERGENCY SERVICE.

Central office apparatus suitable for emergency use is held in reserve, but in case of an emergency like the San Francisco or the Baltimore fire, or the floods in the middle west early in the year, all of the stock and all of the resources of the Western Electric Company itself, and of the many suppliers who are carrying stocks on orders of the Western Electric Company, are available to restore service to the public. Therefore, there has been provided for the associated company a continuous protected supply of material designed especially for its requirements, designed, made and inspected with a view to low maintenance and good service, distributed at a minimum of expense to the departments using it.

Rate Changes Ordered in California

The California Railroad Commission has directed the Pacific States Telephone Company to cut its rates for unlimited service in San Jose and neighboring territory to the extent of about $15,000 annually.

It ordered the company to discontinue its practice of demanding a deposit of $5 for telephone installation, and advised the corporation that it would not be allowed in the future to make an annual payment of 4½ per cent of its gross revenue to the parent company, the American Telephone and Telegraph Company, explaining that it had been paying nearly twice as much as the actual circumstances warrant.

"A device for diverting excessive dividends" is the language of the commission's decision, in discussing the practice of making a heavy payment to the holding corporation.

"The parent company, which controls entirely the destinies of this company, takes a 4½ per cent slice off the top of the gross revenue of this company, before anybody else gets a chance at such revenue," says the decision.

The commission has ruled to "limit the amount which shall be a charge for the service rendered by the American Company, to the lowest fair value of the service actually rendered."

The practice of demanding a $5 deposit before a telephone is installed by the company is characterized as "a discrimination against the poor patron, and one that cannot be tolerated." The commission orders that the custom be discontinued.

Because this practice is very general throughout the state, the commission's ruling will have a far-reaching effect. For this reason, the commission has asked that a careful record be kept of the cancellation of telephone contracts, so that it may be seen just how much the company loses through not having the protection of the advance deposit.

The new rates at San Jose are as follows:

One-party business line, from $5 to $4.50; two-party business line, from $3.50 to $3; one-party residence line, from $3 to $2.50; two-party residence lines, from $2.50 to $2.25; two-party residence line, wall equipment, from $2.25 to $2.

The complaint on which the commission based its decision was originally filed by the city of San Jose before that municipality transferred its authority over its utilities to the state board.

The new rates and rulings went into effect last month.

Of Interest to the Trade

What the Telephone and Accessory Manufacturers Are Doing to Advance the Art

NATIONAL INDEPENDENT ASSOCIATION'S CONVENTION.

The annual convention of the National Independent Telephone Association will be held at Hotel La Salle, Chicago, January 13, 14 and 15. It is important that all independent telephone men attend.

CONVENTION DATE CHANGED.

The convention of the Independent Telephone Association of America will be held at Hotel La Salle, Chicago, January 6, 7 and 8, and not on the dates announced last month.

JANUARY 6, 7 AND 8.

Frank B. Cook's Semi-Automatic System

Frank B. Cook, familiar to all telephone men as a large manufacturer of telephone apparatus and supplies, announces the completion of a radical improvement in telephone operating systems. At this writing it is understood that a full demonstration of the new equipment will be made at both the independent conventions to be held this month in Chicago. A 1,500-line exchange, with this equipment, is now being installed by Mr. Cook for the Home Telephone Company, Fort Wayne, Ind., and is expected to give service before February 1. In this installation three operators will do the work now performed by twelve.

The system will be known as the Corwin semi-automatic system. It is a semi-automatic system which may at any time be converted into a full automatic system. This semi-automatic, combining human intelligence with a machine, is claimed to produce a possible increased efficiency of over six hundred per cent in local to trunk connections and a reduction in time of the average operator from 16.02 seconds to 2.4 seconds, and possible increased efficiency of over five hundred per cent in local to local connections, and a reduction in time from 14.16 seconds to less than 3 seconds.

This system is not limited in its application to multiple switchboards only. It is a complete system in itself, capable of furnishing every class of telephone service, and so flexible it may be operated in connection with almost any other known system or type of telephone apparatus.

It provides a real secret service; the operator is automatically disconnected before the two subscribers are connected and cannot thereafter cut in or listen to the conversation. The chief operator, wire chief and assistants are the only ones equipped to ring up and talk to a subscriber.

The talking circuits are absolutely balanced, insuring most satisfactory telephonic conversation, local or long distance. This system permits a subscriber to quickly secure a connection; to instantly disconnect and secure another and as many following in rotation as may be desired. He may do this in the middle of a conversation, regardless of whether he is the called or calling party. Each subscriber has control of his line independently of the operator.

This system can be economically and quickly applied to any existing common battery multiple switchboard, without interfering with its continuous use. This statement also applies to other switchboards, but to a less degree.

Traffic distribution in this system is so arranged that but one call can reach an operator at a time, thus avoiding that nervous strain experienced in present manual operation. This makes it readily possible to secure and retain the relatively small number of operators required.

The apparatus itself is strikingly simple, and free from mechanical defects.

The Corwin systems are so different in principle that the patent office authorities of the United States and many foreign countries are allowing broad claims in many of these patents. This in itself is an indication that the system is something new, when one considers the numerous preceding patents. Over one hundred applications for patents have already been filed, and others are being filed—the total number will reach several hundred.

Mr. Cook has had over thirty years' experience as a telephone engineer, during the last fifteen years of which he has also been a manufacturer of telephone apparatus, and has achieved in both fields a high degree of success and reputation. The apparatus, which is all made in his factory, has his unqualified guarantee for efficiency, workmanship, durability, and freedom from patent liability.

Repeating Coils for Telephone Service

Ever since the first idea of electrical communication over wires, either by dot and dash or direct conversation, was put into practice, heroic efforts have been made by the inventive mind to perfect as far as possible all phases of electrical apparatus, with the result that evolution has played its part to a point almost beyond belief. Obstacles thought unsurmountable have been gradually overcome.

No. 1—No. 8-A Coil.

Telegraphing, when finally adopted as a method of communicating over distances, short and long, was found to be simple to a degree, compared with the wonder of it, but, early in its commercial success, the telegraph companies were faced by the necessity of adopting some method of construction by which a single wire could be utilized for the transmission of a number of messages simultaneously. Undaunted, however, the scientific and inventive brain of the day took issue with the problem, fully realizing that the extremely high cost of long lines for single messages

would, in consequence, compel a correspondingly high rate for transmission, thus placing telegraphic communication so far within the pale of luxury that it could not be utilized nor considered by the masses. It is volume which spells success to every business and, as the telegraph companies must likewise depend upon volume, every encouragement was given the inventor, with the result that the duplex and quadruplex systems used today in telegraph operation are the crowning achievement of those scientific delvers.

Telephony, with its maze of apparatus, at once secured a firm foothold in the world commercial and social, becoming the right hand of the business man in his office and a servant in his home—a boon, in fact, upon which he became wholly dependent. For long his country cousin was denied all this, but now, we find the vast stretches of our farming country punctuated at nearly all necessary points by independent toll companies and, being in a large measure prepared for first-class local service with constant demands for more extended service, the majority of the companies are confronted by the necessity of providing longer lines.

The construction of long toll lines has, in the past, been more or less prohibitory owing to the necessary outlay, coupled with the fact that all available capital was

Fig. 2—No. 9-A Coil.

required to construct the shorter local lines between the several exchanges as they were established and the outcome of this growth is an extensive system of pole lines carrying numerous short local circuits. Thus the necessity frequently arises of building up a circuit through a half dozen switchboards in order to reach points a short distance away, by comparison, resulting in poor transmission, annoying interruptions from operators coming in on the line for supervision and, withal, slow service.

Telephone companies that owe their inception to a local desire or demand for neighborhood communication now find themselves obliged to cope with an ever-growing demand for good commercial service between the constantly increasing distant points of their systems, which means that they must equip their line with a system whereby more than one message may be transmitted over a single line at the same time or be prepared to shoulder the great expense necessary in the construction of long toll trunks.

As a matter of fact, the same problem which confronted the telegraph companies faces the independent telephone companies today; but fortunately the manufacturer, abreast of the moment, is prepared to assist them, at once obviating the large expense of extensive reconstruction and making for the desired betterment of service.

It is hardly necessary to say that the telephone manufacturer realized early in the day the coming necessity of a multiplex system which would permit the successful working of telephone circuits. Innumerable attempts to solve the problems were made, but with indifferent success accompanied with many absolute failures until the nut was cracked by the development of a repeating coil

Fig. 3—No. 13-A Coil.

affording high efficiency and perfect electrical balance, together with the elimination of cross talk between the several lines, by a systematic arrangement or transposition of the engaged physical circuits.

To meet these conditions the Kellogg Switchboard and Supply Company offers various types of repeating coils designed especially to meet the requirements of every class of telephone service. In magneto switchboards in which two clearing-out drops are used in the cord circuits, repeating coils, whenever used, must be constructed so as to prevent ringing current from passing inductively from one winding to another, while the high frequency voice currents must pass with only slight loss. These requirements are fully met by the No. 8A repeating coil shown in Fig. 1.

For another class of service, a repeating coil which will allow both voice currents and ringing currents to pass, is required. Such a repeating coil is used in cord circuits of magneto switchboards, having single clearing-out drops, as well as in phantom telephone circuits, and under similar conditions. For this purpose, there are three different styles of repeating coils, the No. 9-A, shown in Fig. 2, the No. 13-A, in Fig. 3, and No. 14-A, in Fig. 4.

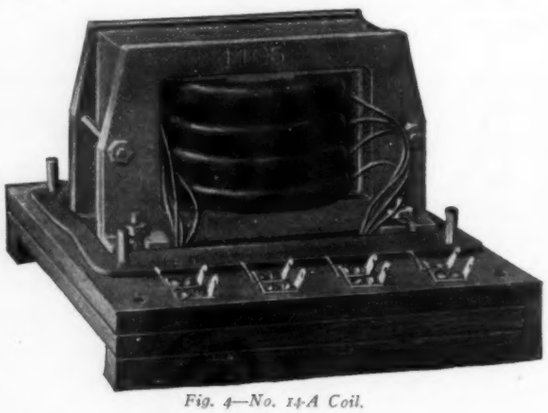


Fig. 4—No. 14-A Coil.

No. 9-A, which is less expensive than the other two, is suitable for use in connection with short lines of low resistance. The No. 13-A was designed especially for phantom and long distance work, and is a most efficient

ring-through and talk-through coil. It is enclosed in an iron case, which excludes moisture and prevents cross talk. It consists of four windings, each of which is wound separately so that if one is burnt out by lightning or high tension current, it can be replaced at small expense, thus making it unnecessary to throw away the entire coil.

Fig. 5—No. 15-A Coil.

The No. 14-A repeating coil is the same as the No. 13-A, aside from the fact that the iron shell is omitted and, as a result, it must be mounted inside of a building where it is not exposed to the elements.

The Kellogg Company has recently placed upon the market No. 15-A repeating coil, illustrated in Fig. 5. This is primarily a talk-through coil but so compact that it can be mounted in a very small space. No. 15-A represents the company's last thought in repeating coil construction and is unhesitatingly recommended as a most efficient coil of that type, as it was especially designed for long distance work, or for any condition in which a high efficiency talk-through coil is desired.

The manufacturer states that he will send bulletins on these coils, and prices, on request.

Automatic's Appreciation of Suggestions

Fifty employes of the Automatic Electric Company of Chicago, manufacturers of automatic telephone apparatus, received tangible evidence of the company's appreciation of the helpful suggestions offered during the past year, when they were presented with watch fobs during a banquet given by the firm's employes on December 22, 1913.

Joseph Harris, president of the Automatic Electric Company, made the presentations after thanking the men for the interest they had shown in their work, and also announced that the year 1913 had been the most satisfactory both in quality and volume of production, since the manufacture of automatic telephone apparatus began 22 years ago.

The fob, a cut of which is shown on this page, bears on its face a facsimile of the familiar dial calling device used in connection with the automatic telephone, with the initials of the recipient in the center. On the back are the words, "Presented by Automatic Electric Company, for Helpful Suggestions, 1913."

The following employes received fobs: J. Turner, G. S. Rudolph, F. Voss, H. B. Perrott, J. Forrest, G. Green, J. Henning, A. Hopkins, G. Anderson, R. Ramsey, B. W. Johnson, S. Gross, J. Evers, J. Meyers, M. Larsen, A. Emmons, E. Jesse, C. Shay, R. Fisher, B. W. Freda, F. H. Borsom, R. Stokely, H. Obergfell, A. Stannelle, T. E. Meyer, E. J. O'Brien, G. A. Meacher, R. Hughes, A. Bernsten, G. Henning, F. R. Quayle, J. J. Higgins, L. F. Wilke, S. E. Witt, E. C. Neumann, C. L. Martin, H. R. Wright, H. Thielberg, C. W. Hinman, William Ross, C. Matthies, G. H. Ayers, J. Klusak, A. E. Wollny, J. J. Kain, H. F. Pfaff, B. Kindred, J. F. Probst and George Lawson.

About two years ago the Automatic Electric Company started the suggestion plan which is briefly as follows:

A suggestion form is supplied to the employes, upon which all foremen are required to report at least once a week. They may send in one or a dozen such forms, but one is the minimum and must either contain a suggestion, or the words, "No suggestions to make this week."

The present plan is a modification of the original idea, under which suggestions were received at any time, but no weekly minimum was set. The result was that the men would forget it for weeks at a time and this prompted the change.

When a suggestion is received, the factory superintendent notes it and refers it to an engineer, who makes an investigation, secures opinions from the employes affected, reports as to the changes in equipment necessary to put the plan into operation, and estimates the saving which will result. With this data the suggestion is returned to the factory superintendent for approval or rejection. A notice is then sent to the maker of the suggestion advising him of the action taken and informing him of the reasons if it has been rejected.

The Automatic Fob.

During the past six months a further modification of the plan has been tried, whereby a special subject for suggestions during a certain period is announced. The employes are informed that while suggestions on any

subject will be appreciated, special attention is invited to this particular theme. The following subjects have been dealt with in this way: No. 1, safety first; No. 2, water, light, power and gas; No. 3, bonus work; No. 4, care of material; No. 5, inspection; No. 6, material and finish; No. 7, scheduling work, chasing, requisitioning and transferring stock.

Various ways of creating and maintaining an interest in the suggestion plan have been utilized. Reminders have been sent through the mail to all heads of departments; cards have been printed and fastened to the transmitters of all telephones, while blotters bearing a list of subjects for suggestions have been distributed.

Very real benefits have flowed from the suggestion plan, for while the Automatic Electric Company's plant was planned and systematized by efficiency experts of recognized ability, it has been found that "the man on the job" is often able to improve the details of the general system, thus materially adding to the efficiency of the methods employed, and eliminating many causes of waste and expense.

The suggestion plan has also had an additional value in giving the employes a keener interest in their work and providing a useful channel for the criticisms always found among workers. The company has taken the attitude that present methods are not necessarily permanent ones, that better and quicker ways of accomplishing results are always in demand, and the reply to the often heard remark, "If I were boss," has been "tell us what you would do."

Changes in Standard Underground Cable

The Standard Underground Cable Company announces the following important changes in its Chicago and St. Louis office territories, consequent upon the death last fall of J. R. Wiley, who for nearly twenty years was western manager with headquarters at Chicago.

E. J. Pietzcker, formerly southwestern sales manager, is made western and southwestern sales manager in charge of the Chicago and St. Louis office of the company, the combined territory of which, broadly speaking, embraces the Mississippi river basin; he will divide his time between these two offices. Mr. Pietzcker has been connected with various branches of the wire and cable industry substantially throughout his entire business experience and is especially qualified to serve the customers of a company which devotes its entire energies to the field of electrical wires and cables and their accessories. He was born in Rochester, Ohio, December 22, 1857, and at first was connected with Sanborn and Warner, who operated under territorial contracts with the Washburn & Moen Manufacturing Company; upon their expiration in 1891 he was regularly connected with the latter company as southern sales agent, for the states of Texas, Louisiana and Mississippi and the republic of Mexico; in 1897 he was transferred to Chicago in charge of city sales until the Washburn & Moen Company was absorbed by the American Steel & Wire Company, for which company he later attended the Paris exposition as a representative in 1900, and was subsequently connected with its Chicago office as salesman and expert in the rail bond department. In 1902 he joined the forces of the western sales department of the Standard Underground Cable Company under J. R. Wiley in Chicago, where he continued until January 1, 1905, when the St. Louis office was established under Mr. Pietzcker's charge. Mr. Pietzcker is a member of various organizations, including among others the Missouri Athletic Club, Midland Valley Country Club, St. Louis Amateur Athletic Club, Engineers' Club, League of Electrical Interests; he is also a Mason and a Shriner, member of the Knights of Pythias, Knights of Honor, an associate member American Society Mechanical Engineers and American Society of Electrical Engineers, and member of the Jovian Order.

W. M. Rogers, formerly chief clerk and assistant to Mr. Wiley, is appointed assistant western sales manager, with headquarters at Chicago. Mr. Rogers has been connected with the Chicago office of the company since December, 1900, and is already well known personally to very many of the company's customers in that territory.

R. C. Houck, who has been appointed assistant southwestern sales manager, with headquarters at St. Louis, has been connected with that office of the company since its organization in 1905, during which time he has represented the company as a salesman throughout its extended territory in the southwest.

E. E. Woodbury is added to the selling force of the St. Louis office of the company at Pittsburgh, with which he has been connected for the past six years.

Cordless Jack Boxes for Way-Stations

A simple switching device for connecting the operator's set in a railroad way-station to one or more lines passing through the station is found in the cordless jack box recently perfected by the Western Electric Company's railway ngineers. The cordless jack box does away with the unsatisfactory knife-switch method of cutting in the operator's telephone or telegraph set on the train dispatching lines. The connection is effected by means of a single conductor plug which is inserted in the line jack corresponding to the line over which it is desired to talk or telegraph.

The cordless jack boxes are of two kinds, one for telephone dispatching circuits and the other for telegraph lines, a different style of jack being necessary in the latter case on account of the different nature of the telegraph circuit and apparatus. One distinctive feature of the telephone jack boxes is that they may be used to connect two or more lines together and have the operator's set bridged in on all of them, merely by using one or more extra switching plugs.

Solid oak is used in the construction of the jack boxes with a cover made of three layers to keep it from warping. This cover is hinged so that it may be opened for inspection. There are no superfluous parts to clutter up the inside of the box. The jacks are made with heavy insulation to prevent trouble from sudden voltage surges or accidental crosses with power or lighting circuits, while all jack springs are widely separated to prevent arcing and burning of circulation. Screw terminals are used for connecting in outside lines. No soldering is necessary. A tie cord is furnished with the switching plug to keep the latter from being mislaid when not in use.

The cordless jack boxes are manufactured in three sizes: the No. 385 type for three lines, the No. 386 type for six lines and the No. 389 type for twelve lines, consisting of two six line units hinged together. Any of the jack boxes can be ordered partially equipped with dummy wood plugs in the unequipped spaces. Jacks can be added at any time by knocking out the wood plugs and screwing in the jacks. Wiring is always furnished for the full equipment.

A number of trial installations of these cordless jack boxes have already been made with gratifying results.

Railway Way-Station Test Boards

An important part of the equipment of the railway way-station operator's office is a ready means for testing and patching the telephone train dispatching circuits, so that interruptions to service may be minimized and a remedy quickly applied should such interruptions occur. To meet the demand for an efficient testing and patching device of this kind, the Western Electric Company has developed and placed upon the market what is known as the No. 2 type test board.

These test boards, the No. 2A, equipped for two metallic circuits, and the No. 2B for four metallic circuits, are made of solid oak and built to withstand more than the ordinary amount of use. The jacks through which the lines are carried are mounted in the face of the board, each with its designation strip. Below these jacks are mounted keys, by means of which the selector and telephone equipment is switched from its regular circuit to the patching cords. The patching cords are connected to terminals inside of the test boards and hang from the bottom of the cabinet. These cords are thoroughly moisture proofed. Wiring is run in twisted pairs and held in place by removable straps.

A striking feature of the No. 2 type test boards is their accessibility for inspection work. A removable cover held in place by hooks gives immediate access to all line terminals, while the apparatus board hinged at the lower edge gives access, when opened to the jack terminals. All wires are visible for inspection when the apparatus board is opened.

The design of the test boards is the result of a careful study of railroad dispatching conditions. It has been found to be general practice to carry the train wire and message wire through the test board, provided two circuits of this kind are installed. If no message wire is installed, it is usual to take two telegraph circuits of iron wire, solder all the joints and transpose the circuit and then bring it through the test board so that it may be used for patching. The telegraph wires may also frequently be brought into the test board even if a message wire has been installed. The point in this is that the train wire, which is the most important, must be kept working in any event, making it necessary to carry the message and telegraph wires through the boards so that they can be used for patching in emergencies.

The No. 2 test boards are equipped to make all the tests and patches ordinarily required on train and message wires. They are an essential for roads with a heavy wire traffic where an interruption to service is a serious matter.

Commission Investigates Washington's Rates

Senator Norris of Nebraska, author of the resolution adopted by the Senate calling for an investigation of the Chesapeake and Potomac Telephone Company of Washington, D. C., by the Public Utilities Commission, has sent to the commission a large amount of information regarding the operation and charges of telephone companies in other cities.

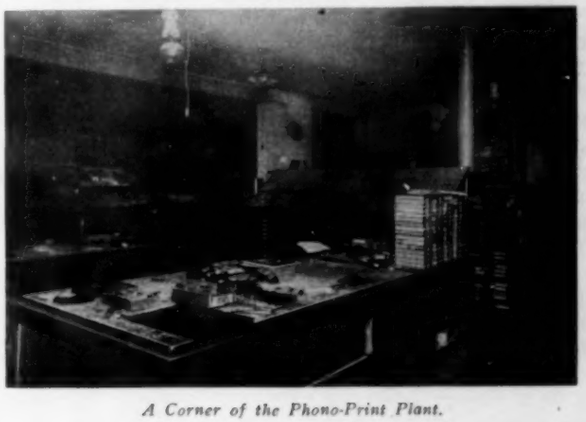
It is shown in this information, accordng to Senator Norris, that in other cities about the size of Washington the charges are considerably lower for telephone service than in Washington. This is true of other cities in which a single company has a monopoly of the business, as is the case in Washington, as well as in those cities where there is competition between two companies.

The Phono-Print Plant

We present with this article two views of the printing plant of the Phono-Print Company of Defiance, Ohio. This company makes a specialty of supplying the independent telephone companies with printed and ruled office forms of a large variety, suited to exchanges of any size. From a very small and humble beginning a few years ago, the Phono-Print Company has succeeded in building up a large and continually growing business extending over the entire United States, Cuba, Canada and Mexico. The company owns a complete

Pressroom in the Phono-Print Plant.

printing plant, housed in its own buildings, and equipped with all the latest and most efficient labor-saving machinery, making it possible to produce its output under ideal conditions and at the lowest shop cost. A complete line of exchange records and blanks, such as corporation records, rental and toll records, lease and rental records, cash books, toll journals, toll ledgers, rental receipts, toll bills, combined rental and toll bills, trouble tickets, toll tickets, stock certificates, corporation seals, voucher checks, two-color bank checks, monthly check report



A Corner of the Phono-Print Plant.

blanks, orders on treasurer, two-color stationery, rubber stamps and paper clips are continually carried in stock; while special requirements receive prompt and intelligent attention. Special emphasis is laid on the fact that the company is in position to furnish two-color lithographed stationery and toll tickets for telephone companies. Specialization and organization have made possible the rapid development of this telephone printing plant, and independent telephone companies have encouraged its growth and expansion.

Book Review

The American Electrician's Handbook, by Ferrell Croft, leather, McGraw-Hill Book Company, 239 West 39th street, New York City, should be a part of the equipment of everyone having to do with electricity in any form, such as wiremen, linemen, contractors, operators, construction engineers and foremen and small plant superintendents.

It is a compilation of practical information gleaned from the personal observations and data file on practical electrical subjects of the author, who is a well known writer of technical subjects for electrical journals, around which has been collated such informative data as was necessary to demonstrate the verity of the author's observations.

It is not a "theoretical" book except to the extent that the information it gives is based on sound demonstrable physical laws.

Written for the unskilled, unscholarly "man behind the switch," some of the simpler subjects are gone into at great length that the reader may by easy stages get a good grasp of the fundamentals of electrical science, leading gradually up to the more complicated subjects which are treated more briefly because of the better understanding of the reader at that time.

The technically trained engineer can derive considerable benefit from this book as well as the untrained man, as practical information on the selection, installation and operation of equipment is given concisely and in an easily findable way. There are a great many illustrations which serve to depict graphically conditions that would otherwise take too much text for explanation.

The price of the book is in keeping with its aim, the dissemination of knowledge for the practical man, being $3.00.

Improvements in Anchors

There have been improvements in ground anchors, and trade magazines are full of advertisements regarding anchors which can be driven or screwed down, but one of the most radical improvements which have been made in ground anchors for some time is the one put out by the Oshkosh Manufacturing Company.

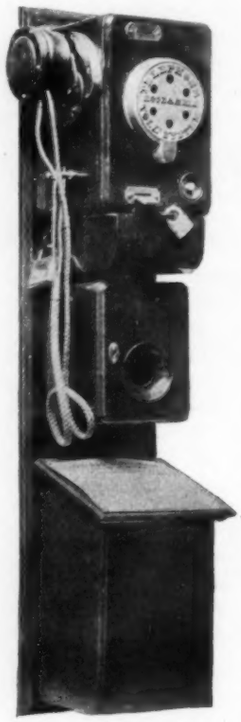
The illustration shows the comparative holding power of different types of anchors compared with the Oshkosh anchor showing the thrust due to the conformation of the plates. The company claims that this great thrust is due to the design of the anchor and it seems to be borne out by the illustration. The Oshkosh company is a large manufacturer of logging and construction tools and has an interesting catalogue which will be mailed to anyone requesting it.

The Silver Anniversary Book

Containing a synopsis of the history of the Electric Storage Battery Company since its organization, and a description of the various manufacturing departments of the plant, the Silver Anniversary Book reviews the many changes that have occurred in the manufacturing process of the storage battery and its influence in the electrical world. Fully illustrated, with its pleasing colors in silver and white, the booklet is an exceptionally attractive piece of literature and will no doubt be of considerable interest to many readers.

First Nickel in the Slot Telephones, 1885

Contrary to popular impression, and even the impression of many who have been in the telephone business during recent years, progress along some lines in telephone business has been remarkably slow.

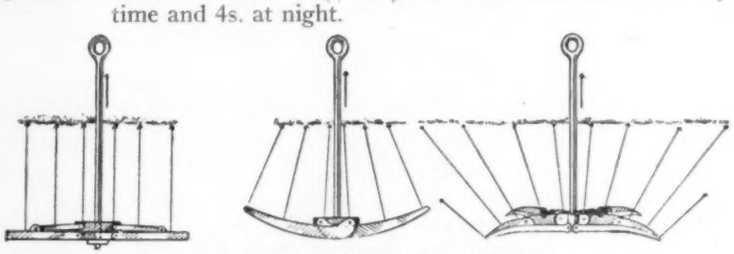


First Slot Telephone.

This is indicated by the illustration on this page of a telephone which was used in St. Louis in 1885, at which time there were some six or seven hundred of these telephones in operation, showing that even at that early date a prepayment nickel pay station, with nickel return feature, was in successful use.

That this present-day accepted practice was fathered by independent telephone development, and that the independents really set the pace, is shown by the same illustration, for this telephone (now an interesting historical exhibit) was manufactured by the Franklin Electric Works. This business was later taken over by P. C. Burns, of the American Electric Company. The telephones were made for the use of the Pan Electric Telephone Company, which operated a successful independent plant at St. Louis nearly thirty years ago.

Experiments that have been carried out show that telephonic communication between London and Switzerland can be carried on successfully, and the service, via Paris, will shortly be opened to the public. The charges at first will be 7s. ($1.70) for three minutes in the daytime and 4s. at night.



Thrust of Oshkosh Ground Anchors.

The Price of Old Cable

Bids on the old cable of the defunct Union Electric Telephone & Telegraph Company, of Rock Island, Ill., were opened December 12 by the commissioners. J. H. Raphael & Son, of Davenport, quoted $100 a ton for the material, and it will be sold to that firm. This is five cents a pound, the figure which the city electrician estimated the cable should bring. It is estimated that there is seven tons of the cable on hand at the city barns. In addition to this the city has removed about 1,100 pounds of copper wire, which will bring a much higher figure. The copper is not being sold at this time.

Brevities of the Business

The Activities of the Whole Telephone Field Told in Short Paragraphs

PERSONAL NOTES.

A. P. Crenshaw, assistant secretary and assistant treasurer of the Chesapeake and Ohio Telephone Company, Baltimore, Md., recently retired after thirty-five years of active service.

The gold medal of the Royal Society, London, has been conferred on Dr. Alexander Graham Bell, in recognition of his inventions, notably the telephone.

R. V. Owens, who has been for some time cashier of the Cumberland Telephone Company, at Lake Charles, La., has been made manager of the Cumberland Exchange at Jennings. D. E. Rivers, of Lafayette, has succeeded Mr. Owens as cashier.

P. J. Nix, formerly district commercial manager for the Southern Bell Telephone Company in Augusta, Ga., has been transferred into the office of Mr. David Laird, division sunperintendent at Savannah.

Ora Adams of Lewistown, Ill., has been named Pekin manager of the Central Union Telephone Company, to succeed Roy Morris.

J. E. Latta, for the past two years an associate editor of the *Electrical Review* and *Western Electrician*, Chicago, has resigned that position and joined the staff of the Underwriters' Laboratories as special agent, with headquarters in Chicago.

P. G. Galbraith, formerly chief clerk to W. Marshall, superintendent of telegraph, Canadian Pacific Railway, Toronto, Ont., has been appointed inspector of the Ontario division of that road. He will take up part of the duties previously performed by the assistant superintendent of the Ontario division, which office was recently abolished.

J. M. Kearney, Western Electric specialist, of New York, handling W. N. Mathews' line, arrived in San Francisco the first part of the week.

Garnett Young, manager of the Telephone and Electric Equipment Company, has returnend to San Francisco from an extended Eastern trip.

Hiram E. Thompson, aged sixty-four years, a former telegrapher, and latterly superintendent of cable maintenance for the Northwestern Telephone Exchange Company in Minneapolis, Minn., died in that city recently. He was a Telephone Pioneer.

A. M. Paulson, formerly in the employ of the Northwestern Telephone Company at Siuox Falls, S. D., has been transferred to Fargo, N. D.

J. B. Cassels, manager of the Southern Bell Telephone Company of Cullam, Ala., has been promoted to district manager with offices at Decatur.

U. N. Bethell, president of the New York Telephone Company of Brooklyn, was presented the gold medal awarded by the Travelers Insurance Company to the American employer that achieved the greatest success in protecting the lives and limbs of his employes

H. C. Goldrick, manager Kellogg Switchboard and Supply Company, San Francisco, is at Vancouver, B. C.

Frank B. Knight, Jr., of the contract department of the Southwestern Telegraph and Telephone Company, Dallas, Texas, was married to Miss Dorothy Higby on November 6. Miss Higby was a member of the force of the Dallas manager's office.

Thomas M. Carter, aged forty-nine years, connected with the New York Telephone Company, and a Telephone Pioneer, died November 7.

Charles R. Truex, for many years general contract agent of the American Telephone and Telegraph Company, New York, will retire on January 1, 1914, and will make his residence with his son at Hendersonville, N. C. Mr. Truex was originally connected with the Home Sewing Machine Company and later with the American Bell Telephone Company as special agent. He was afterward general manager of the Electric Accumulator Company, but returned to the telephone service later. Mr. Treux was interested with Mr. H. W. Pope in promoting and organizing the Telephone Pioneers of America and served two years as a member of its executive committee.

H. A. Brown is the new manager of the Griggs County Telephone Company at Cooperstown, N. D. Mr. Brown was formerly connected with the Cheyenne Telephone Company at McVille, N. D.

Jay J. McIntyre, manager of the Vicksburg office of the Michigan State Telephone Company, has been transferred to the Kalamazoo office and Raymond Conway placed in charge of the Vicksburg exchange.

John Brinkman of Rozellville, Wis., is the new secretary of the Marshfield Rural Telephone Company, having been appointed in place of H. G. Hambright, resigned.

Lawton T. Hemans of the state railroad commission, has been selected as one of the three men to sit with the National Association of Railway commissioners for the interstate commerce valuation of railroads, telephones and telegraph lines. He will be with the third district aggregation which represents Michigan, Indiana, Illinois and Wisconsin.

F. W. Watson, who has been secretary of the Butler County Telephone Company of Iowa, for the past several years, severed his connection with the company at their annual meeting and E. E. Knoll was elected his successor.

NEWS FROM THE FIELD.

ALABAMA.

The Louisville & Nashville Railroad has installed an automatic telephone system for use in its numerous offices in Birmingham. The service, in effect but a few weeks, has demonstrated that it is superior to old methods.

ARKANSAS.

The Southwestern Telegraph and Telephone Company has a force of about 25 men stationed at Clarksville, making various improvements on the company's system.

David Gates of the State Tax Commission, and associates, who own stock in the Leola telephone exchange, are building a long-distance line from Leola to Sheridan. Connection will be made with the Sheridan exchange, and a first-class long-distance service between Sheridan and Leola will soon be in operation.

CALIFORNIA.

The Home Telephone and Telegraph Company of Santa Barbara applied to the commission December 8 for authority to refund $35,000 of notes.

The Nevada, California and Oregon Telephone and Telegraph Company of San Francisco has applied for authority to issue bonds in the sum of $67,299, and to use a portion of the proceeds in taking over the plant of the California Northern Telephone and Telegraph Company. The two companies operate in portions of California, Oregon and Nevada.

The Lindsay Home Telephone and Telegraph Company of San Francisco has applied for authority to execute a note for $5,000 for the purpose of making extensions to its lines at a cost of $4,500, and for paying existing indebtedness in the sum of $500.

The Pasadena Home Telephone Company has planned a new trunk line from Pasadena to Los Angeles and work will begin soon.

The Railroad Commission has rendered a decision granting authority to the California Telephone and Light Company to issue $100,000 of bonds and $50,000 of stock, the proceeds of which will be devoted to new construction and equipment, and refunding indebtedness.

The Reedley Telephone Company of Reedley has completed plans for the construction of a new exchange. An appropriation of $2,500 has been made for outside construction and improvements.

The engineering department of the Pacific Telephone and Telegraph Company, San Francisco, has completed plans and is taking bids for the new building to be erected at 622 South Hill street as a main office for the company.

A telephone system is to be established at Esparto, Yolo County. It will include an exchange and will connect up with five rural telephone lines. Two additional farmers' lines are in prospect.

The Home Telephone Company is about to cut into service its new exchange in South Pasadena. When the new exchange is in full operation, South Pasadena will have one of the best telephone systems in Southern California.

The Lindsay Home Telephone and Telegraph Company has

applied to the railroad commission for authority to execute a note for $5,000 for the purpose of making extensions to its lines at a cost of $4,500 and for paying existing indebtedness in the sum of $500.

DELAWARE.

The Limhi Telephone Company, Wilmington; capital, $200,000; Henry B. Bothum, Wilmington.

Radio Telephone & Telegraph Company, Wilmington, $3,000,000.

FLORIDA.

The long distance telegraph connection which is so highly applauded by east coast towns from Miami to Jacksonville, was effected by the Brevard County Telephone Line, which is a Cocoa institution, the owners, Messrs. Buck and Reed, living at Indianola, on Merritts Island. Their line extends from New Smyrna to Fort Pierce, and has been in operation for about six years. Recently connection with the Bell was acquired.

The latest actual improvement in Fort Meade is the putting under ground of all open telephone wires east of the exchange building. The Fort Meade Telephone Company reports operations in progress.

GEORGIA

Home Telephone and Telegraph Company, of Hampton, has been chartered with a capital of $20,000. Officers are S. A. Agnew, president and treasurer, and J. R. Fitts, manager.

ILLINOIS.

Articles of incorporation have recently been filed by the Sigel Mutual Telephone Company, of Sigel, with a $5,000 stock. A. W. Bigler, A. R. Chestnut and Hiram Walker are the incorporators.

Gibson Home Telephone Company, Gibscon City; capital stock increased from $25,000 to $50,000.

The directors of the Farmers' Telephone line at Yates City held a business meeting Wednesday afternoon, December 17.

The annual meeting of the stockholders of the Colusa Telephone Exchange was held in Colusa, December 16. C. F. Bross was elected president, L. L. Newton, secretary, and T. S. Shaw, treasurer for the ensuing year.

The Melvin Telephone Company of Bloomington has increased its capital stock from $7,500 to $14,000.

Workmen have been engaged rebuilding the telephone line of the Woodhull-Ontario Company at Galesburg. New poles have been put in and new wire strung.

Plans for the entire rehabilitation of the Joliet district of the Bell Telephone Company, part of which work is already under way, have been received by District Manager White of Joliet, from estimates prepared by engineers who have made a thorough inspection of the conditions there. The cost of the repairs to be made will total into many thousands of dollars.

Dr. J. C. Flowers of Joliet was elected president of the Dixon Telephone Company at a recent meeting of the board of directors. C. B. Cheadle, also of Joliet, was elected secretary and assistant treasurer. The financial statement of the company showed that a substantial increase has been made in the earnings of the company. There are at present 2,210 telephones in Dixon.

The Mutual Telephone Company is repairing its lines at Frederick.

Edwards County Mutual Telephone Company, Albion; dissolved.

The Chicago Telephone Company is removing its wires from the poles in Wheaton and is installing the underground system. The severe storms of last winter impaired the telephone service to such an extent that it was decided that the wires should be laid undeground.

Fayette Home Telephone Company, St. Elmo; capital, $20,000; telephone exchange and toll business; incorporators, Hattie M. Stice, Earl F. Stice, J. A. Stice.

Messrs. Schelle, Johnston, Hayes, Typer and Eckerd, a committee representing the Mutual Telephone Company, have contracted for the purchase of the interests of the Rock River Telephone Company in the city of Polo. The Mutual Company will have charge of the county telephone in Polo and will work in harmony with the Rock River Telephone.

The Automatic Telephone Company has been granted a 25-year franchise to erect poles and install its system in the village of Sears.

An ordinance was presented and given a first reading repealing section twelve of an ordinance granting to F. L. Bills and E. L. Wortham the right to construct, maintain and operate a system of telephones in and on the streets, highways and alleys in the city of Canton.

The stockholders of the Murphysboro Telephone Company, of Murphysboro, held a special meeting December 11, to consider an increase in capital stock from $50,000 to $250,000.

The Central Union Telephone Company leased 12,000 square feet of space in the McAleenan building, on South Washington street, Peoria. The space is to be used as utility shops for the storage of material and repair of cables and conduits.

The annual meeting of the stockholders of the Burnside Telephone Exchange was held in Dallas City, December 9.

Keck Telephone Company, Peoria county, Princeville, $10,000; conduct and operate telephone system. Incorporators, W. M. Keck, G. J. Keck and B. H. Hopkins.

The annual meeting of the Lanark Mutual Telephone Company will be held in Lanark, Saturday, January 10, 1914.

INDIANA.

The annual meeting of the Home Telephone and Telegraph Company of Fort Wayne was held Monday night and old officers were re-elected as follows: President, Charles S. Bash; vice-president, John B. Reuss; secretary and general manager, William L. Moellering; treasurer, Max B. Fisher; board of directors, Charles S. Bash, August E. C. Becker, W. A. Bohn, Max B. Fisher, Henry Freeman, G. Max Hoffman, Isadore Lehman, William L. Moellering and John B. Reuss; board of auditors, H. H. Hartwig, Herman J. Freiburger and Henry F. Moellering. William C. Schwier presided as chairman and F. E. Bohn as secretary. At the close of the election Mr. Moellering again appointed Frank E. Bohn as assistant secretary and general manager.

The Burns City Co-operative Telephone Company, Burns City; capital, $1,000; to operate telephone lines; directors, G. D. Crane, J. K. Summerville, A. Williams.

IOWA.

The Seymour Telephone Company was sold recently to F. Dunn, of Milo, G. W. Patterson, of Corydon, making the sale. The exchange will be entirely remodeled and rebuilt under the supervision of Mr. Patterson, who has been employed by Mr. Dunn to look after his entire telephone interests, located at Milo, Moravia and Seymour. Messrs. J. K. Green and D. L. Murrow, of Corydon, were stockholders in the exchange.

The North Liberty Telephone Company of Springdale held its annual meeting December 17. J. A. Westfall was elected president and H. H. Phelps, secretary-treasurer, for the coming year.

The Grundy Center Mutual Telephone Company is nearing the completion of the new system and when it is in operation it will be the most complete system of any town of its size in this state. The system will be a metallic circuit system with most of the wires in underground conduits. The switch board is one of the very latest models and is operated by small electric lights instead of drops.

The Doolittle & Brinton Telephone Company, whose lines cover the Williams and Blairsburg fields and serve about seven hundred patrons, has been purchased by the New Richland Land Company, who will take possession March 1. The system is valued at about $20,000 and was recently traded to the New Richland company for farm lands located near Albert Lea, Minn.

Telephone poles for line from Tyrone to Staceyville to connect with the Iowa Telephone Company lines are being erected and an exchange will be operated at Tyrone in the near future.

The Farmers' Mutual Telephone Company held its annual election in the court house at Marshall, and closed up the year's business.

The stockholders of the Springville southwestern telephone line held their annual meeting at the Millwood school house, December 4.

At the annual stockholders meeting of the DeWitt Telephone Company of Clinton, held December 8, the following directors were elected: T. W. Large, W. H. Talbot, J. G. Pearse, D. Armontrout, C. H. Arthur, G. M. Smith; from whom were chosen as officers: President, T. W. Large, vice-president, J. G. Pearse; treasurer, C. H. Arthur; secretary, Henry Seifert.

The Hastings Mutual Telephone Company has been incorporated by George Shaw, who is president; J. E. Martin and others.

The Winthrop Telephone Company has elected the following officers for the coming year: Directors, W. B. Miller, A. E. Whitney, H. C. Unbehaun, H. Higman and A. W. Norman.

KANSAS.

Dodge City is to have a complete new telephone system as soon as it can be installed. This is made possible by the agreement reached between the city and the Arkansas Valley Telephone Company after negotiations of a year.

The Kansas Independent Telephone Association of Salina held their annual meeting and the following officers were re-elected: T. L. Yumans, Osawatomie, president; Samuel Tucker, Pleasanton, vice-president; F. B. MacKinnon, Topeka, secretary. The executive board consists of seven members: J. D. Waters, Bonner Springs; Olaf Larson, Lyndon; A. B. Clarke, Oskaloosa; C. L. Brown, Abilene; A. J. Stevens, Hiawatha; L. A. Walker, Parsons; C. A. Sloan, Pratt.

The Hanston Telephone Company of Hanston is now incorporated with $1,500 stock. The incorporators are: John Bauer, H. F. Solmans, H. A. Shultz, L. F. Holmes, C. B. Wycoff, J. B. Eakin and W. J. Auerbach.

KENTUCKY.

The stockholders of the Shelby County Telephone Company, at their annual meeting, elected the following directors: W. J. Thomas, J. S. Turner, C. S. Weakley, J. Wirt Turner, and Ben Allen Thomas. The board elected W. J. Thomas, president; C. S. Weakley, vice-president; J. Wirt Turner, secretary; P. R. Beard, treasurer; J. D. Wimp, general manager. The annual report showed 937 telephones installed in Shelby county.

The Eagle Telephone Company, with twenty-one incorporators, filed articles of incorporation December 8. The business of the corporation shall be to build telephone lines, operate, conduct and carry on a telephone business in the county of Scott and adjoining counties in Kentucky. The value of the capital stock is $45 each share. The incorporators are Messrs. George Penn, M. D. Sanford, C. T. Smith, W. V. Mulberry, Jacob Mulberry, Jr., John Harrison, A. D. Stevens, A. S. Crosthwaite, Mrs. Sarah E. Burgess, Cam Skinner, Leonard Bankhill, Henry Hinton, N. M. Burgess, Mrs. Delia Holland, R. P. Giles, T. C. Giles, Noah Bailey, R. P. Fields, J. A. Harrison and L. T. Dryden, all of Scott county, and Mr. John Kitchen, of Harrison county. The officers elected were: President M. D. Sanford; vice-president, C. T. Smith; secretary-treasurer, G. M. Penn.

The Cumberland River Telephone Company, Lindsay; capital, $1,000. Incorporators: James Hawn, Phillip Fox, G. M. Faulkner, W. J. Bays, C. L. Heath, J. F. Powell, Joe Grant and others.

Within a short time trains on the Louisville division of the B. & O. S.-W. Railroad between New Albany and North Vernon will be dispatched by train orders transmitted by telephone. It was thought the new system would be ready for use by the first of the year, but it is believed it will be several weeks later before it is in operation.

MARYLAND

The Bell Telephone Company has a number of men extending additional wires on their line from Cumberland to Terra Alta.

MICHIGAN.

The state treasury collected $22,000 from the Citizens Telephone Company, of Grand Rapids, in payment of back taxes.

The Union Telephone Company, which has had offices and exchange in the Keeler block, Owosso, moved recently to its new $20,000 building on West Exchange and Water streets.

In the near future, the Michigan State Telephone Company will reconstruct and modernize the exchanges at Norway and Niagara.

The stockholders and directors of the Banfield office of the Citizens' Telephone Company held their annual meeting and banquet at the E. L. Edmunds hall, where the annual election was held and the following officers were named for the ensuing year: Delos Neil, president; Reuben Stiles, vice-president; A. M. Edmunds, secretary, and George Winters, manager. Earl McGlocklin and Frank Stiles were elected to fill the two places as auditors.

The Michigan Bell Telephone Company is making rapid headway on its new construction work in Ishpeming. By the new year it will have all its lines cut over to the new central, when the old Marquette County exchange in Miners' National bank will be vacated.

The annual meeting of the Holloway Telephone Company was held December 8, and the following officers elected for the ensuing year: President, Charles Fowler; vice-president, John Calhoun; secretary, Harry Smith; treasurer, Dr. J. W. Nixon.

Stockholders of the Onaway-Alpena Telephone Company recently authorized the directors of the company to petition the Michigan railroad commission to raise $58,000 by bonding for the erection of a new building for the company's Alpena property, the installation of a modern switchboard system, the placing of the underground cables in the business section and certain improvements to the Onaway and Gaylord exchanges. It is also proposed to rebuild the line from Alpena to Hillman and to install a metallic circuit between Alpena and Rogers.

Williamston Telephone Company, Williamston, $20,000.

MINNESOTA.

The Northwestern Telephone Exchange Company announces that work will be begun immediately on a new exchange to be located in the Minnehaha district, the cost of which is estimated at $300,000.

Farmers Telephone Company, at Mildred, has been organized by Albert Eastvold and others and lines will be built in every direction.

The Palisade Rural Telephone Company has been incorporated for $5,000 by H. E. Hansel, William J. Weber, Thomas Thompson, J. H. Tolvstad, Lydia Hansel, Dr. J. O. Werntz and H. E. Meyers, all residents of Palisade.

The Hammond Telephone Company, of Hammond, is installing a new switch-board in the central office.

The Hennepin Telephone Company of Long Lake has been sold by its owner and organizer, J. C. Hursh, to Emery H. Reynolds, for $8,000.

The Northwestern Telephone Exchange Company is erecting a two-story brick building, to cost $18,000, at Goff avenue and Dearborn street, St. Paul, for the Robie exchange. It will be occupied April 1.

The annual meeting of the stockholders of the Havana Rural Telephone Company was held December 1, in Havana, at which time officers for the ensuing year were elected as follows: President, H. G. Hickok; secretary, John Wavrin; treasurer, John Pichner, Jr., and directors H. L. Kubat, Hugo Wrede, Joseph Tomsicek, Anton Ripka and John Deml.

MISSISSIPPI.

The Cumberland Telephone Company is installing from Meridan to New Orleans a new toll line which is known as the phantom circuit, and is said to be superior to the two physical circuits. It is claimed that it will be possible to hear even a slight whisper when this is done. The new circuit will be in operation at an early date. During the coming year it is understood that the Cumberland will build a handsome three-story pressed brick home.

MISSOURI.

That a merger of the two telephone companies of Carthage, Carterville and other cities will be brought about within the next few months, is the belief of W. H. Warren, secretary and treasurer of the Home Telephone Company. Proceedings to combine the two systems have been commenced. No specified time for completing the merger was stipulated in the application.

The People's Telephone Company, of Graham, has been incorporated with a capital stock of $6,510 by G. M McNeill, O. L. Mowrey and others.

The Mutual Telephone Company, of Bethany, has been incorporated with a capital stock of $50,000 by John A. Lilly, W. M. Foster and others.

The Linneus and Rural Telephone System, of Linneus, was leased December 3 to Olly Beugh, of Carrollton, who will take charge December 15.

MONTANA.

The Mountain States Telephone Company, at Twin Bridges, has commenced construction on another farmers' line out of Sheridan. The poles and other material are now on the ground and the line will be put into shape for service as soon as possible.

At a meeting of the owners of the West Side Beaverhead Telephone Company, of Dillon, held December 4, it was agreed to incorporate, under the name of the West Side Beaverhead Telephone Company. Articles of incorporation were adopted, and a board of directors, and other officers elected. Theodore Nelson was elected president, C. W. Conger, secretary-treasurer, and the following compose the board of directors: Nels P. Nelson, James P. Murphy, I. F. Hunsaker, Theodore Nelson and C. W. Conger.

There is a well-defined rumor in Anaconda that the Independent Telephone Company and the Mountain States Telephone Company will be merged very shortly, probably January 1.

NEBRASKA.

The Ord Independent Telephone Company, of Burwell, moved into their new quarters recently.

The Bell and Hooper Telephone Companies have come to an agreement whereby service between Fremont and Hooper will be resumed as soon as the necessary changes of wires can be made.

NEW YORK.

The New York Telephone Company filed plans with the bureau of building recently for the erection of a new exchange at 2739-2745 Main street, Buffalo. The building will be two stories high and will entail an expenditure of $55,000.

Nelson Goodsell, of Buffalo, special agent for the New York Telephone Company, is authority for the statement that his company intends to spend $88,000 in the reconstruction of its system in North Tonawanda.

Theodore N. Vail, president of the American Telephone and the Telegraph Company, declared that he thought the telephone would be in use between New York and San Francisco by the time the exposition is held.

The Stromberg-Carlson Telephone Manufacturing Company, Rochester, has recently issued some loose-leaf price sheets, superseding all others, referring to its telephone construction material and supplies.

NORTH DAKOTA.

The Douglass Telephone Company, of Fargo, has let the contract for the building of nine miles of new line into the Blue Hills to connect with the Garrison line.

Poles have been erected and other arrangements made for establishing another farmers' telephone line out of Minto, to be known as the Pulaski telephone. It has thirteen phones for a start.

Carpio has increased telephone connections.

The Harrison Telephone Company of Minot is constructing a line about twelve miles long east and north of Minot.

At Elgin, the North Dakota Independent Telephone Company will build an exchange, and extend its lines. This company is considering building a line from Plaza to Parshall, where an exchange will be installed.

Great improvements are predicted in the telephone system at Rugby.

The Tri-County Telephone Company, of McGregor, has been incorporated with a capital stock of $25,000, by Paul P. Tunseth, Nels Langerberg and others.

OHIO.

The public utilities commission has approved a bond issue of $75,000 of the Troy Telephone Company, at Columbus. The money is to be used in making extensions and improvements in the property of the company. The bonds are to be sold for not less than par and to bear interest at the rate of six per cent.

Applications for the approval of the State Utilities Commission to a common stock increase of $50,000 was recently filed by the Middletown Telephone Company. The money is to be used to make needed extensions and improvements to the property. A hearing on the application was held December 2.

The Jefferson Telephone Company, Steubenville, P. P. Lewis and others; $400,000.

OKLAHOMA.

Elmer Speaker, local manager, announces that the Pioneer Telephone and Telegraph Company will begin the work of rebuilding the plant in McAlester. An appropriation of $38,000 has been made for the work, which will require several months. The company will erect 386 new poles and string a number of cables, taking the place of many open wires.

OREGON.

The Multnomah and Clackamas County Telephone Company, of Gresham, has submitted its annual report to the stockholders, showing that the company is free from debt for the first time and has a small balance on hand.

The Pacific Telephone and Telegraph Company, of Portland, will expend $50,000 for improvements and repairs to the plants and cable systems in the business districts.

The Kellogg Switchboard & Supply Company has secured an order for complete central office equipment for the Independent Telephone Company, Forest Grove, Oregon.

PENNSYLVANIA.

On account of the increasing business, The Bell Telephone Company, of Johnston, has moved its business offices to the Colonial Annex at 628 Main street.

The exchange of the Consolidated Telephone Company, now located in the Pioneer Bank building, Scranton, will be changed about the first of January to the Woolworth building, across the street. A more modern switch board will be installed and other improvements made.

The United Telephone and Telegraph Company, of Philadelphia, has placed orders for improvements at the Lancaster branch to cost $50,000.

The telephone line between Millsboro and Oak Orchard is being repaired by a force of linemen.

Notice has been filed at Harrisburg by the Central District Telephone Company of the increase in its capital from $15,000,000 to $25,000,000, and creating of an indebtedness of $25,000,000, authorized at the special meeting of the stockholders recently.

PENNSYLVANIA.

The Central District (Bell) Telephone Company will erect a ten-story building on Seventh avenue, Pittsburgh, at a cost of $1,000,000.

The Bell Telephone Company is replacing poles between Woodbury and Pennsgrove and are as far as Gibbstown.

Papers announcing the merger with the Bell Telephone Company of Pennsylvania of Eastern Pennsylvania telephone companies have been filed at the Capitol. The companies taken over are Halifax-Enterline, Dauphin; Trexlertown, Lehigh; Womelsdorf and Rohrersburg Rural, Berks; Landisville and Strasburg, Lancaster.

SOUTH CAROLINA.

Home Telephone and Telegraph Company, of Hampton, has been chartered with a capital of $20,000. Officers are: S. A. Agnew, president and treasurer, and J. R. Fitts, manager.

TENNESSEE.

The Cumberland Telephone and Telegraph Company, at Henning, was destroyed by a recent fire.

The Home Telephone Company, of Munford, with a capital of $2,000. The incorporators are J. G. McCain, J. F. Wooten, A. H. Yarbrough, S. H. Bass and C. T. Strong.

Local offices of the Queen and Crescent Route have received word that an order has been issued from the offices of Vice-President T. C. Powell, which will mean the installation of a telephone line between Oakdale and Chattanooga, a distance of 84 miles, upon the completion of which, telephones will be used for the dispatching of trains on the entire line between Cincinnati and Chattanooga. Work will begin as soon as the necessary material can be assembled.

The Nettle Carrier branch of the Home Telephone Company, of Overton county, with a capital stock of $1,500. The incorporators are J. T. McDonold, Wm. McDonold, R. L. McDonold, I. E. Winton, B. F. Allred and W. Y. Keisling.

Levi Phelps has purchased the Henry telephone exchange and has taken charge. He has installed a new switchboard and is making other extensive preparations for the improvement of the service.

TENNESSEE.

Ground has been broken for the erection of the new two-story telephone building at Columbia.

TEXAS.

The Southwestern Telephone and Telegraph Company is pushing the work on a three-story block on North Bois d'Arc Avenue and West Erwin Street, Houston. The building is 100 feet in length, will be constructed of highest grade material and will be supplied with all appliances and facilities for a business of its character.

The work of installing a new 300-line switchboard in the Bishop exchange has been completed by the Bishop telephone Company, and the improved service is highly appreciated by the patrons.

The Southwestern Telephone Company has a crew of men at Colmesneil putting up wire along the Missouri, Kansas and Texas to connect with its main line at Barnum.

The Southwestern Telephone Company has completed its line into Elysian Fields, Harrison County.

Rural telephones have formed a perfect network in Washington County, and every place of importance is connected with the main office in Brenham.

The Southwestern Telegraph and Telephone Company has a force of twenty men reconstructing its entire line in Jefferson. The company will put in 14,000 feet of new cable, 240 new poles, 62 cable terminals. No crossarms or open wires will be used in the future. The poles, instead of being placed on the main streets, are being put in the alleys.

WASHINGTON.

Richland Valley farmers have organized a country telephone system called the Yakima and Columbia River Telephone Company. It will probably be incorporated for $2,500. The officers are: E. E. Floyd, president; J. R. Gardener, vice-president; Wm. Reed, secretary.